RAILROAD GAZETTE

FRIDAY, JUNE 29.

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Contributions.

Fuel Test of Philadelphia & Reading Locomotives.

READING, Pa., June 19, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in your issue of June 15 an article relative to a test of a Philadelphia & Reading engine, fitted with a modified form of Wootten fire-box. As the report there given is rather general in character, one more in detail may be of interest.

The test, a report of which is inclosed, was made on a grade having a rise of from 150 ft. to 175 ft. per mile. The duty of all engines was similar, *i. e.*, pushing empty coal cars up this grade, and the weights of trains were accurately ascertained for comparison. The water was measured and the coal weighed under the personal supervision of Mr. Steffe (the General Road Foreman) and the writer.

The fire-box of engine No. 183 as used in tests numbered 1 and 2 in the report, is of the style made by the Philadelphia & Reading Co. from 1876 to 1887. In test No. 5, by order of Superintendent of Machinery G. W. Cushing, this box was gradually narrowed until 18 in. less in width than the box used in tests Nos. 1 and 2.

This change resulted in raising the value of fuel, or increasing the efficiency of the engine from 74 per cent. to 81 per cent. of an engine with a Millholland fire-box burning lump coal, which was taken as a standard. The evaporation was raised by this alteration from 5.6 lbs. of water per lb. of coal with the old form of wide fire-box, to 6 254 lbs. of water per lb. of coal, with the narrower form of box, an increase of 10 per cent.

The new Philadelphia & Reading engines, Nos. 910 to 931 inclusive, now being delivered, have the narrower form of box, as in test No. 5, burn buckwheat coal, and mark a forward movement in the development of the Wootten fire-box.

The Millholland fire-box, used on engine No. 197, used in tests Nos. 3 and 4, is the ordinary narrow box used in the old style of Philadelphia & Reading engines, as made by Mr. Millholland. It is interesting to note that the Millholland box, with egg coal, and the old style Wootten box, with egg coal, used the same amount of fuel per ton train hauled, and that the highest average evaporation was accomplished with the Millholland box, using lump coal.

The report is made from a series of tests which lasted some five weeks. For individual days the evaporation ran higher than is indicated by the average as given in the report. On one day the evaporation of engine No. 197, during test No. 3 with lump coal, ran up to 8.455 lbs. of water per lb. coal, and on another day to 8.23 lbs of water per lb. coal.

The Pennsylvania & Reading fire-box, or Wootten box narrowed, with buckwheat coal, reached 6.556 lbs. of water per lb. of coal one day, and on another day 6.531 lbs. of water per lb. coal; while the two best days for the engine with the old form of Wootten box showed 648 and 5.856 lbs. of water per lb. coal respectively.

I hope that these figures, which were carefully obtained, may be of interest to your readers.

A. B. ROPES,
Engineer of Tests, P. & R. R. R.

The tabulated results of the test are appended.

The Rail Head and Wheel Flanges.

CUMBERLAND, Md., April 17, 1888.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The system for shapes of rail head and wheel flange suggested by my communication of April 13, seems to be laid open to serious criticism on grounds both that it permits of a dangerous liability to mounting of the wheel flange upon the sloping rail head, and that the closely fitting flange occasions an amount of friction which restrains the tractive power of the locomotive and as well the movement of the train. As I have already communicated my views upon a *practical* observation of the danger, if any, to be apprehended from rail mounting, I feel that this question is hardly worth a discussion from a *theoretical* standpoint. However, I would furthermore say, that as between a *rail* with a head with side sloping to the degree I suggest and the bearing side of a wheel *flange* sloping to a *much greater degree*—as may often be noticed—it would seem that the latter would sooner mount *any* rail head than that the former would permit it.

Fig. 1 shows the shape of a soft locomotive tire after a returning, and its subsequent wear; and Fig. 2 shows the same

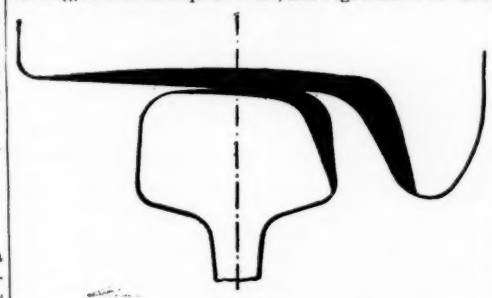


Fig. 1.

tire on its second turning, and its subsequent wear. This tire was upon a front driver of a Consolidation locomotive, and it never mounted the rail nor occasioned any trouble other than on account of its too rapid wear. It was suffered to continue in use, among other reasons, that observations could be made of its safety under conditions affecting the subject of this inquiry. As the wear progressed, and up to the ultimate degree as shown, no elements of danger were developed, and the tire was eventually discarded only because it was thought the observations had gone sufficiently far and further possible risks should be avoided. Notwithstanding the sharpness of the worn flanges no frog-point was mounted, nor switch tongue disturbed from its place. Of course the guard-rail protected the frog-point, and the worn away condition of the flange increased the clearance and lessened the liability to engaging with the point. The points of the tongue-switches were *not*, however, protected with guide-rails in front of them. The advisability of providing guide-rails is, however, admitted, under the risks, practically, of running trains toward the points. The principal disadvantage of the worn condition of the flange and wheel-tread as shown, was found in their permitting much sidewise slipping of the locomotive when at hard pulling upon the curves, and thereby inducing increased disposition to general loss of adhesion to the track. Contrary to the views that traction

Fig. 2.

would be assisted by the *additional play* upon the track under the worn conditions of flange and rail head, at the curves, it has been found that the best service is obtainable where the sloping rail head and worn flange are brought into conditions of usual gauge. It has also been observed that with the worn condition of the treads of the tires, in conforming with the top surface of the rail, there is not so much adhesion as when the wheel treads are comparatively new, and there is a seeming "bite" to the rail at the *point* of contact. It is now reasoned that this so-called "bite," when on the *side* of the rail-head, under the sliding movement of the impinging *point* of the *non-fitting* wheel flange, occasions more frictional resistance than by the *line*, or greater surface, of impingement by the *fitting* wheel flange. If it be examined, it will be seen that, theoretically at least, where the flange does *not* fit the side of the rail head, but merely touches the same at some prominence in the development of either, such contact is merely a point; but where the side of the head and flange fit one with the other, such contact is a line. The general wheel flange, by reason of its circular position at right angles to a horizontal line directly across both rails of the track, *diverges* from either the point or line of contact with the side of the rail-head. On a tangent, therefore, the line of contact between the flange and rail head, when closely fitting, is directly beneath the centre of the wheel; and, on a curve, it is a little to one side or the other, according to the position of the centre line of the axle with reference to the radius of the curve.

It is on a study of the position of this nearly vertical line of contact that the theoretical liability to mounting the inclined slope of the side of the rail-head must be ascertained. That the flange does not, even on curves, *practically* impinge upon the side of the rail-head at any *very* appreciable distance either side of a vertical line with the centre of the wheel, may not only be accepted through actual examination by the eye, but it seems evident through a study of the line of wear into the flange, showing, as it does, a tendency at the outer point *toward the rail rather than a diversion from it*, that there is no contact at the outer point of the flange with the side of the rail-head, until the said outer point comes within the "line of contact" more nearly beneath the centre of the wheel.

To summarize my views they are: That the natural lines of wear, as practically developed, are not only the proper ones for resisting most successfully the known tendency to wear, but at the same time they afford the least possible frictional resistance.

Theoretically it has been taught that the weight alone, irrespective of area of contact, is the measure of the resistance to movement over such metallic surface involved by this discussion. *Practically* it can be ascertained that a *sharply* impinging contact offers more resistance than when the weight is distributed over a greater surface.

JAMES A. MILLHOLLAND.

Strength of Ropes.

A French engineer has experimentally investigated the quality of workmanship, the strength, the extension and the elasticity of ropes and cables, round and flat, of hemp, of aloe and of iron and steel wire. The apparatus, constructed in 1880, for these investigations consists of a horizontal hydraulic press and a steelyard of three levers, with a sliding weight on the last, by which resistances from 2 lbs. to 60 tons can be measured. Higher pressures, up to 100 tons, are indicated by means of a pressure gauge on the body of the press. Specimens submitted for trial are fastened by winding each end of the rope on a grooved pulley, specially designed, the extremity being knotted and secured against a fixed edge in the groove. The power is applied by means of a ring applied to a separate edge in the groove. The piston of the press is 11.81 in., and that of the piston rod is 5.33 in., with a maximum stroke of 31.5 in. The pressure is about 100 atmospheres. The usual length of cable for testing is about 13

RESULTS OF TESTS OF ROPES.

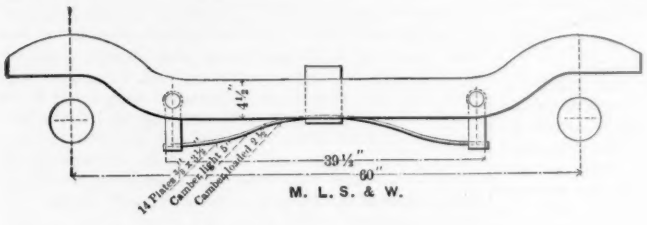
		White hemp.		Tarred hemp.		White manilla.	
Circumference before rupture	inches.	4.33	4.33	4.25	4.25	3.94	3.94
Circumference after rupture	"	3.86	3.74	3.70	3.74	3.27	3.39
Length tested,	feet	32.8	32.8	32.8	32.8	32.8	32.8
Length measured for testing elongation	"	13.1	13.1	13.1	13.1	13.1	13.1
Elongation	inches.	27.2	28.3	25.6	26.4	23.2	22.8
Section of the four strands	sq. in.	0.819	0.819	0.819	0.819	0.819	0.819
Section of the piece.		1.490	1.490	1.481	1.481	1.246	1.246
Resistance	tons.	7.94	7.43	5.22	5.64	5.44	5.96
Resistance of the four strands per sq. in.	"	9.78	9.02	6.35	6.86	6.60	7.24
Resistance of the piece per sq. in.	"	5.27	4.95	3.49	3.87	4.32	4.76
Weight of the whole piece tested	lbs.	17.4	17.6	18.7	19.6	15.0	15.2

FUEL TEST—PHILADELPHIA & READING RAILROAD. *Office Superintendent M. P. & R. E., Sept., 1887.*

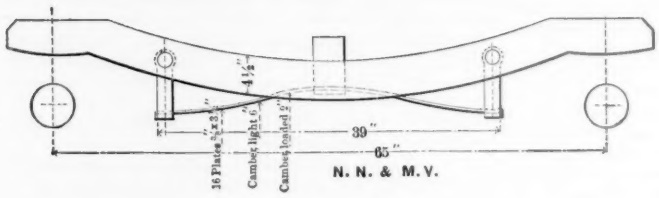
KIND OF FIRE-BOX AND CLASS OF FUEL USED.	Date of test.	No. of engine.	Miles run per day.	Gallons of water used per day.	Tons of coal used per day.	Average tons weight of train.	Lbs. of coal per ton—train hauled 81 miles.	Lbs. of water evaporated per lb. of coal.	Average steam pressure.	Average temperature. Water.	Air.	Average miles run per ton of fuel.	Value of fuel as developed by amounts used per ton train.	Average lbs. fuel wasted in puddling fire each night.
Wootten fire-box (buckwheat coal) 1.	Aug. 29 to Sept. 2, inclusive.	183	81	8,232	6.122	206.965	59.16	5.6	135	61°	73°	13.2	74 %	527
Wootten fire-box (egg coal) 2.	Sept. 5 to Sept. 9, inclusive.	183	81	9,083	5.083	210.263	48.349	7.443	139	62°	67°	15.9	91 %	1,210
Millholland fire-box (lump coal) 3.	Sept. 12 to Sept. 16, inclusive.	197	81	7,618	4.09	186.427	43.91	7.797	125	61°	64°	19.8	109 %	.....
Millholland fire-box (egg coal) 4.	Sept. 19 to Sept. 21, inclusive.	197	81	7,929	4.626	190.855	48.476	7.14	121	59°	62°	17.5	91 %	.....
P. & R. fire-box (buckwheat coal) 5.	Sept. 26 to Sept. 30, inclusive.	183	81	8,848	5.893	216.048	54.548	6.254	140	56°	59°	13.7	81 %	490

Approved, G. W. CUSHING.

(Signed) A. B. ROPES, Engineer of Tests.
C. F. STEFFE, General Road Foreman.



M. L. S. & W.



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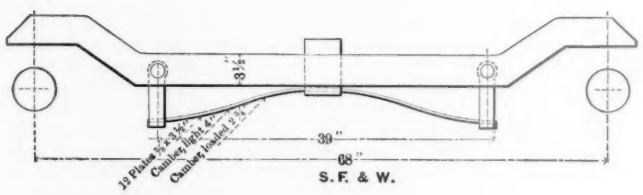

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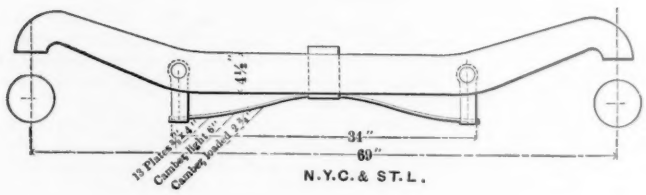

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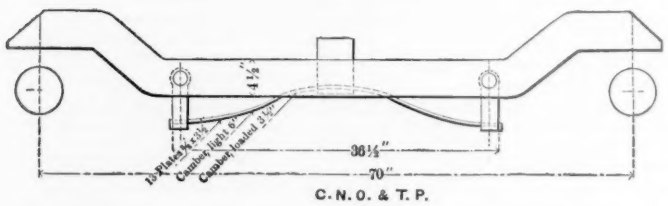

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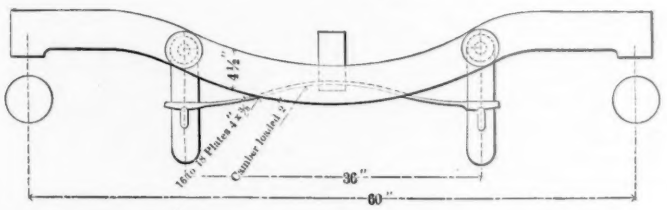

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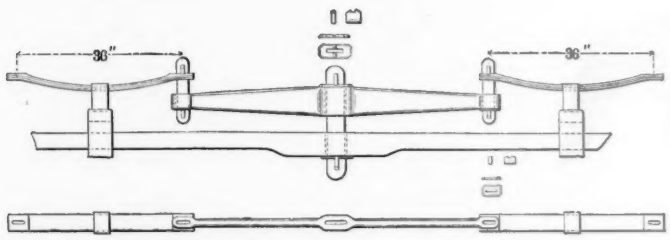
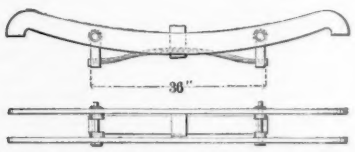
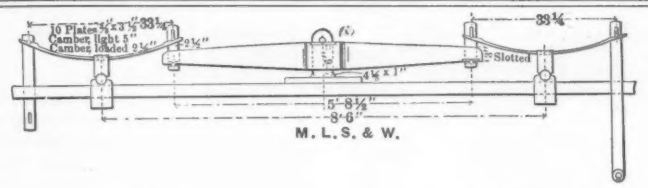




Form of Driver and Truck Equalizers Recommended by Committee.



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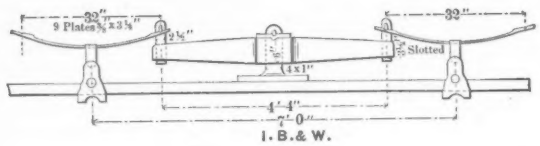

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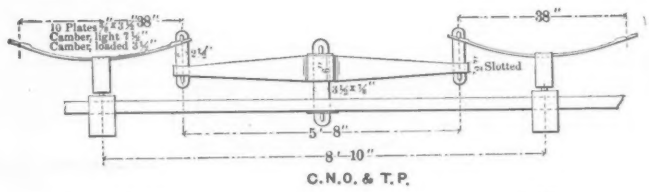

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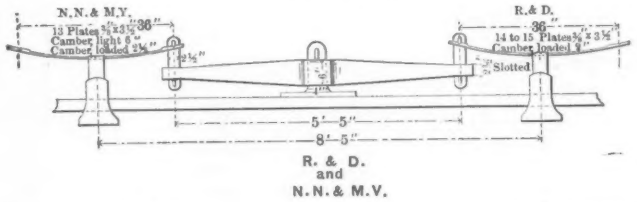

R. & D.
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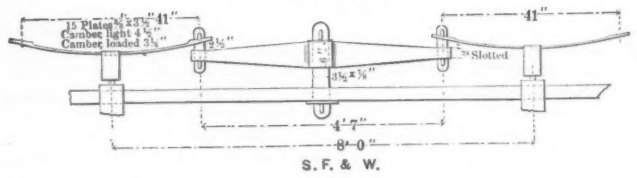

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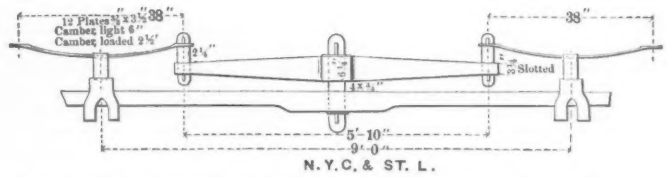
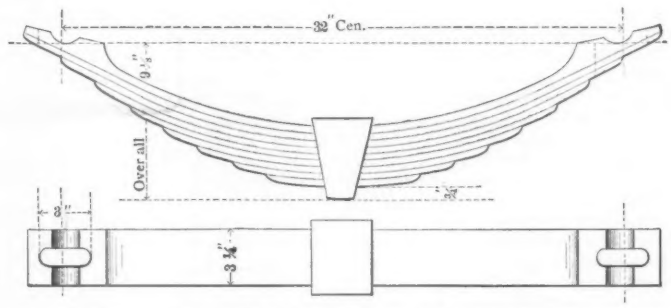


N. Y. C. & ST. L.

Forms of Driving and Truck Springs and Equalizers used by Various Roads.



Spring with Taper Band, Made by the A. French Spring Co.

SPRINGS AND EQUALIZERS.

See REPORT OF COMMITTEE, MASTER MECHANICS' ASSOCIATION.

ft. The weight of the apparatus, exclusive of the pump, is 7¾ tons.

Ropes and cables of white hemp and tarred hemp were procured for testing, imported from Italy and Russia, in addition to those obtained in France, of long fibre, handspun, with from 50 to 55 twists to the yard; 1⅛ yard of rope yarn sufficed to make 1 yard of cable. A selection of results of testing, for elongation and tensible resistance, is given in the annexed table.

The results of many tests of flat tarred ropes have given a mean strength of from 3.43 tons to 3.75 tons per square inch, rupture taking place at the points of attachment. The elongation rarely exceeds from 5 to 6 per cent.

From all the results of testing, the average ultimate tensile strength of rope was as follows:

White hemp	4.76	tons to	5.08	tons per sq. in.
Tarred hemp	3.54	"	3.81	"	"
White manilla	4.44	"	4.76	"	"
White aloes	2.54	"	3.17	"	"
Flat ropes of tarred hemp or tarred manilla	3.54	"	3.81	"	"

The results of practice show that round ropes and cables may be worked, with but moderate attention, at a stress equal to one-third of the breaking stress, and flat ropes one-fourth. In ordinary industrial practice the proportion is often but from one-sixth to one-eighth.

Ropes made from esparto and cocoa fibres have an ultimate resistance of from 1 ton to 1¼ tons per sq. in.

Wire ropes for mining service, of the first quality, have an ultimate strength of from 40 to 45 tons per sq. in. of metal section.

According to one system of testing wire, it is strained to one-tenth of its total resistance, and is exposed to the fall of a weight of 4½ lbs., from a height of from 5 ft. to 6½ ft. It withstands from eight to ten falls before rupture.

From the results of numerous experiments it is found that cast-steel wire ropes stretch from 4 to 6 per cent. before rupture, with an elastic limit of from 2 to 3½ per cent. Such ropes bear three-fourths of the breaking stress before exhibiting any signs of failure. The author is of opinion that as iron has superseded hemp as the material of standing ropes, so iron will be superseded by steel.

Springs and Equalizers.

The accompanying illustrations should have accompanied the report of the Committee on Springs and Equalizers read at the recent Convention of the Master Mechanics' Association. The engravings unfortunately did not reach us in time for publication last week. The report and discussion will be found on page 409 of our last issue.

The recommendations of the Committee are given below in a convenient form for reference. When not otherwise stated, the recommendations apply to both driver and truck springs.

1. The best size of steel is 3½ in. × ⅝ in. crucible steel.
2. The best length from centre to centre of hangers is 36 in.
3. The best number of plates for driving springs in an engine with 56,000 lbs. on the four drivers is 12.
4. The best number of plates for engine truck springs with about 34,000 lbs. on the truck is 16.
5. The best amount of camber when free is 4½ in., and 2 in. when loaded.
6. We would insist on the same size of steel for all classes of engines, whenever it is possible, and regulate the capacity by the number of plates.
7. We prefer the slot to the stirrup hanger, because the width is generally too limited to permit using a stirrup without cutting away the sides of the spring.
8. The best method of applying bands is to place the bands on hot and upsetting with machinery or sledge and flatter

and cooling rapidly. Prefer iron 3½ × ½ in. on top and sides, and ⅝ in. thick on bottom, for both driving and truck springs, and would not recommend making bands wider at bottom than at top.

9. We make no recommendations about bandless springs.

10. The best equalizer for drivers is a solid bar with slotted ends and centre for hangers and post, a steel gib through the hangers and post, also the frame slotted to allow the post to pass through, with steel gib on under side of frame. Prefer this as cheaper and less liable to give trouble from breakage of bolts. (See accompanying illustration.)

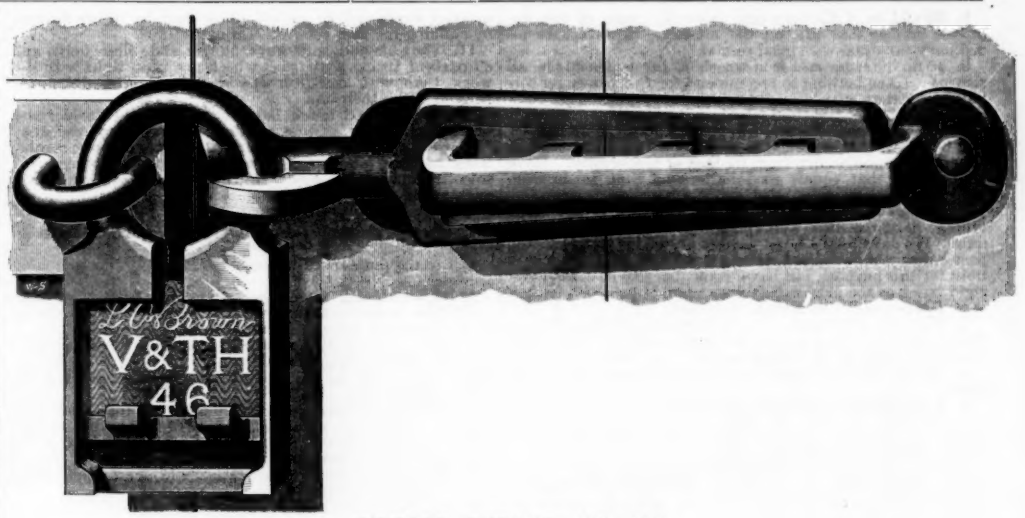
11. Engine truck equalizers are best made as shown in accompanying sketch, two bars 4½ × ¾ in.

The remaining engravings show the practice of the different roads referred to in the full report.

Car Door Fastenings.

We illustrate herewith two novel devices for fastening and sealing freight car doors, which have been recently introduced. The first is an adjustable hasp and glass seal combined, as shown in the upper figure. The principle of the seal is the same as that usually employed in seals making use of a glass, the fastening being effected by a spring, which is covered by the glass and cannot be released except by breaking the latter. The seal consists of a ring with a slot in one side, the part containing the glass being made of sufficient weight to fall into position by gravity. To unfasten the car after breaking and removing the seal, the slot is turned to a horizontal position, when it is readily pulled off the hasp. The hasp or hook is fastened to the door by means of a link with four slots, as show in the cut. When the hook is unfastened and pulled outward it drops and hangs perpendicularly. It can then be moved along to any one of the four spaces in the link. When in the horizontal position, as shown in the cut, it is securely held in one of the spaces. As here shown, the door is completely closed. If the link were in the next notch the door would be fastened open one inch; if in the fourth notch, 3 inches. This feature is valuable in cases where it is desired to leave a door partially open for ventilation, and yet have a perfect seal. This seal is the invention of L. A. Brown and is manufactured by the Pacific Lock and Seal Co., of St. Louis. The company furnishes special books for keeping a record of seals used; the labels, which are pasted to the glass, being bound in the book and detached as wanted. The labels made by the company are printed with engraved lathe work and copyrighted.

The second illustration shows a fastener made by the Hoke Car Door Fastener Co., of Chambersburg, Pa. This fastener is designed to be sealed with the ordinary lead and wire seal, and its chief merits are in the effective way in which the door is kept perfectly tight and prevented both from moving longitudinally and laterally. The peculiarly shaped hook on the right is fastened to the car door, the hook extending over its edge. The lever hasp is fastened to this hook by a ring, as shown, and is preserved from loss by the small space between the hook and the end of the door, which prevents the pulling of the link off the hook. The curved end of the lever hasp enters into the recessed casting, as shown in the illustration, which casting is sunk flush with the side of the car. On closing the door the curved end of the lever is inserted in the recess and its outer end pressed toward the side of the car. This motion insures the tight closing of the door, and also insures that the latter shall press tightly against the door post, this being effected by the peculiar shape of the hook and the link which it engages. This feature makes the fastening especially applicable for use on cars carrying cotton, hay, or other combustible goods, as it makes a tight joint, thus preventing sparks being blown into the car. This fastener is in use on cars of the Pennsylvania and Cumberland Valley railroads.



CAR-DOOR FASTENER AND SEAL.

Made by the PACIFIC LOCK & SEAL CO. *St. Louis, Mo.*

The Master Mechanics' Convention.

PROCEEDINGS ON THURSDAY, JUNE 21.

The new constitution, as proposed by the Committee appointed for that purpose at the last convention, was read and adopted after some discussion.

The Report of the Committee on Ashpans and Dampers was then read and received without discussion. This is to be regretted, for it will be seen that the report covers a far wider field than is indicated by the mere title, and the construction of the ashpans and dampers has a very important influence on the steam generating powers and fuel economy of the locomotive. The time, however, at the disposal of the Convention was limited and hardly permitted of a full discussion of many of the subjects brought forward.

PREVENTION OF DANGEROUS ESCAPE OF LIVE COAL AND SPARKS FROM LOCOMOTIVE ASH PANS.

The Committee on this subject submit: That for the prevention of dangerous escape of live coal and sparks from the ash pans of locomotive engines a departure is needed from present practice in the design, construction, maintenance and operation of these appurtenances.

They find that ash-pans as at present constructed, in the majority of cases, are defective in design in that little attempt has been made to render them air tight; that connections and dampers are light and often insufficient to hold themselves in place, and that by reason of frailty of the material parts they soon become misshapen to such an extent as to be practically valueless either as draft regulators or for fire protection

In construction investigation shows that any kind of a workman is good enough to make an ash pan. Angle irons with rivets partly driven, damper rods and levers with punched holes, and key bolts picked up at random, stuck in them, very often a ⅛-inch bolt in a ⅜ hole, damper doors cut away for grate shakers and eccentric straps, leaving holes for all the live coals to roll upon the track as they come through the grates. Hinges often riveted awry and frequently not fastened at all, just hung on and waiting for the excuse of a jolt to fall on the road. The whole affair put together in airy "bird cagey" fashion that leaves little to be wondered at that the cry is, "the men will not work the dampers on the road." The entire absence of any rule as covered by question 4 of the committee circular of inquiry, so far as they could learn, leaves no room for the criticism of the engineers. If mechanical superintendents and master mechanics think the matter of not sufficient importance to educate the men to, and provide facilities for the prompt and easy operation, and by reason of slovenly design and construction encourage the neglect of maintenance it is not to be wondered at that operation exists often in the order of the "man on the right" to "get down and see if them doors is propped up" before starting his run.

The recommendation of the Committee is: That for coal of a given analysis standard grates be designed and adopted. That the setting and attachments of the same be to the association's standard as far as practicable.

That a standard ash pan be adopted for the various types of engines; the same to be made of sheet iron with angle iron corners properly riveted and caulked; that the ends be of cast-iron with cast-iron doors, the doors and frames to be machined to a tight joint, and the joint between mud ring and the ash pan frame to be hermetically sealed and securely fastened; the rods and connections of damper doors to have pins of ample size, properly fitted, and arrangements for taking up any lost motion.

That the manner of connecting with dampers be made a standard; that the location of the handles for controlling the dampers be made a standard, and the position to be one easily accessible to either of the crew. That the men changed from one engine to another or employed from other roads may know at once where to find them and how they are to be operated.

That the overflow from the injector be allowed to run into the ash pan.

That sprinkling hose be attached to the discharge pipe of left injectors as permanent fixture, to provide a means of putting out the cleanings from the ash pans where necessary to clean out the road and live coal is raked out after shaking down.

That as far as practicable hollow stay bolts be used to supply air for combustion, the damper doors to be used only for cleaning and for heavy work. The air admitted to be controlled, if desirable, by sliding dampers independent of the ash pan connections.

That proper instruction be given all employés whose duty connect them with handling engines as to the care and management of ash pan dampers, grate shakers and slash bars.

That for engines in the same run regular points for cleaning ash pans be established.

That stringent rules be made covering the conditions and points at which grates may be shaken and dampers opened.

That inspectors at terminals be held strictly to account for condition of ash pan and connections, grates and water overflows. That traveling engineers test each engine and examine each engineer at some point on the road weekly instead of annually.

That section foremen be encouraged to report through division superintendent any engine that drops fire.

That test be made by some road or roads to ascertain the value of the above, if any.

The Committee conclude by giving a description of a device for the automatic regulation of the amount of air admitted to the grate, the dampers being actuated by the variation in the boiler pressure.

Committee, { G. W. ETTENGER, E. D. ANDERSON, W. H. THOMAS.

The report of the Committee on Tender Trucks was taken as read.

REPORT OF COMMITTEE ON TENDER TRUCKS.

The Committee issued the following circular of inquiry.

1. Please give a description or blue-print of your standard tender truck, and state if you use centre and side bearings on both trucks.
2. Do you use the same truck for passenger and freight service?
3. Do you fit up your tender trucks with any more care or labor than you do your trucks for freight cars?
4. Do you run any heavy tenders in fast passenger service, and if so, have you found it necessary to design a special truck for this service?
5. Mention defective points in your ordinary truck, and method of overcoming such defects.
6. Do you use a dust-guard for your journal boxes; and if so, describe the kind giving the best results?
7. What is the size of your standard journal and axle?
8. What material is the best for journal bearings?
9. What diameter and kind of wheels do you use in your tender trucks for the different kind of service, and what diameter would you recommend for fast passenger service?
10. If you use steel-tired wheels, are you troubled with flange cutting, and to what do you attribute it?
11. In using steel-tired wheels, have you found that the life of the truck is lengthened, or requires less repairs because of the smoother running of the steel tires? If so, can you give any data?
12. What material do you prefer for axles, and what are your reasons for the preference?

We trust that all will respond to above queries, and contribute any other information that will be valuable to committee in compiling report on this subject.

We received thirteen responses:

F. C. Smith (P. D. & E. R. R.):

1. Front truck centre bearing, back side bearing.
2. Yes. 3. No. 4. No.
5. Have found on rough divisions that elliptic springs in ordinary truck would not stand, replaced trucks with common freight trucks having spiral springs, and have had no further trouble on rough roads.
6. Yes—wood.
7. 3¾ × 7 in.
8. Brass—7 copper, 1 tin with soft babbit filling, not over 2 in. wide.
9. Use 38-in. wheel; have no fast passenger trains.
10. Use cast steel.
12. Prefer iron axles, because they break less than steel.

G. W. Ettenger (N. N. & M. V. R.):

1. Diamond truck; use both centre and side bearing on both trucks. Use standard freight car truck for this purpose, 33 in. D. P. cast iron wheels.
2. Use same truck for passenger and freight.
3. No difference in the fitting except that there is a change in the springs; use spirals under freight cars and elliptics under tenders.
4. The heaviest is behind 19 × 24 in. express engines, 3,400 gallons water capacity; 12,000 lbs. coal is the usual load. These engines are used on express and mail trains over the mountainous portion of our road. Have not found it necessary to design any special truck for this service.
5. Have found no defects in design other than strengthening up some of the parts.
6. Use a dust-guard made of linwood; have used and like vulcanized fibre very well.
7. 4 in. diameter, 7 in. long.

THE HOKE CAR DOOR FASTENER.

Made by the HOKE CAR DOOR FASTENER CO., *Chambersburg, Pa.*

8. Should be of the very best material; some of the improved bronzes that are on the market. However, we use ordinary car brass with good results.

9. 33 in. diameter cast-iron wheels as far as possible in all service. Have nothing to recommend for fast passenger service better than wheels we are using.

10. Do not use steel-tired wheels under tenders.

12. New hammered iron. Do not like scrap on account of dirt being likely to be found in them, and do not like steel on account of unreliability from its lack of uniformity. Have seen nothing that equals good hammered iron, made from muck bar iron carefully piled.

We hang the brakes to the tender frames and not to the trucks; hang the shoes well up approaching the centre of the axle. We have used a large variety of tender trucks in the past years, and have tried almost everything that ever was built for this purpose, but have come back to the diamond rigid truck as the most satisfactory of all.

D. Drummond (Caledonian, Scotland):

1. We don't use trucks. Our tenders hold 3,200 gallons of water and 5 tons of coal, and are supported on steel under frames mounted on six wheels each 4 ft. in diam.

4. We use the same tender for heavy passenger and goods traffic.

6. Yes. Patent, McNee & Co., London.

7. The axles are 6¼ in. diam. in middle, 7 in. diam. at wheel seat, and have outside bearing 6 in. diam. and 12 in. long with centres 6 ft. 6 in. apart.

8. The composition of the journal bearings is as follows: copper, 32 lbs.; tin, 4 lbs.; spelter, 2 lbs.; and bush metal 92 lbs. These make up the contents of one crucible, and weigh 130 lbs.

10. We are not troubled with flange cutting.

12. The material we use for tender axles is best "Siemens' mild steel.

Thos. B. Twombly (C., R. I. & P. R.). Blue print.

1. We use side bearings only on back truck.

2. Yes. 3. No.

4. Total weight of tender about 28 tons. No special truck for passenger service.

6. No.

7. 3½ × 6½ in.

8. We use common brass.

9. For passenger engines, 33 in.; for freight, from 30 down to 24 in. We have no trouble with the 33 in. wheels.

10. Have some steel-tired wheels, and have been troubled a little with flange cutting, but not seriously. Attribute it mostly to trucks being out of square.

11. Can give no data.

12. Iron. There is a greater tendency to crystallization in steel than in iron, and therefore iron is safer.

James Meehan (C., N. O. & T. P.). Blue print.

1. Centre bearings on both trucks; side bearings on rear truck only.

2. Yes. 3. No. 4. Yes.

5. The springs have found to be too light, and have strengthened accordingly, as well as the truck being strengthened generally.

6. Yes; merely a piece of wood about 6 × 9 × ⅝ in., with 4¾ in. hole in one end.

7. Journal, 3¾ × 7 in.; axle, 6 ft. 11¼ in. long.

8. 6½ copper to 1 of tin.

9. 33 in. cast-iron wheel.

12. I find that the best results are obtained by using a proportion of ¾ selected scrap and ¼ muck bar.

G. W. Stevens (L. S. & M. S.). Three blue prints.

It is our practice to use, to a limited extent, steel-tired wheels (otherwise cast-iron is exclusively used), and we have no trouble with flange cutting, the size being 39 in. diameter when the spread of the truck will admit. When 36 in. wheels are used the spread must be 51 instead of 48 in. as given in blue print.

Iron axles are used exclusively, the difference in price between iron and steel not justifying the use of the latter.

For journal bearings it is our practice to use a composition bearing in proportion of about six parts of copper to one of tin.

Francis R. F. Brown (Canadian Pacific).

1. Blue print.

2. Use the same truck for both passenger and freight service, the only difference being in the diameter of the wheel.

3. Tender trucks are made entirely of iron, while the freight car trucks are partly of wood and of entirely different design.

5. Run 3,600 gallon tenders in fast passenger service, but standard truck is sufficient.

6. The dust-guard used in the M. C. B.

7. The tender axles are M. C. B., 4½ in. diameter at centre.

8. Our standard passenger car brass lead lined for journal bearings.

9. Use 33 in. wheels cast-iron "special" quality, for freight service; but in passenger service for 16 in. and 17 in. engines, 33 in. wrought-iron steel-tired wheels, and for 18 in. and 19 in. passenger engines 40 in. wrought-iron steel-tired wheels, same as we use under passenger car equipment; both the latter sizes are manufactured by Krupp.

10. Use steel-tired wheels, and have no trouble with flange cutting. Where such occurs it arises from defective building.

12. Steel axles are cheaper and better.

T. W. Gentry (R. & D.). Blue print.

1. A strictly centre bearing truck; with side bearings or rubber on back truck.

2. Same truck for passenger and freight service.

3. Exercise a more rigid inspection of parts of new tender trucks, and select best journals, etc., for this service.

4. Run 3,000 gallon tenders; capacity, 6 tons coal, and have found it necessary to design the truck shown by blue print.

5. Former tender truck was the ordinary Thielsen pattern, iron channel transoms, with iron end pieces and swing bolsters. We had trouble keeping rivets tight, and found the bolster hangers—which were solid welded links of 1¼ × 1 in. iron—were too light and broke. Then made rigid bolster truck as shown.

6. Simple wood dust-guard, fitted in a suitable recess provided in oil box, gives good results.

7. Standard tender truck axle, has 8 in. × 4 in. button journal, is 5 in. at wheel seat, and 4⅝ in. in centre; and is same as our 60,000-lb. freight car axle.

8 We use and get excellent results from solid bearings made in our foundry of composition 100 lbs. lake copper, 14½ lbs. Banca tin, 2 lbs. pig lead. This is used on tender and passenger car trucks only. We use solid bearings, composed of 65 lbs. old bearings, 35 lbs. copper, 5 lbs. tin, 2 lbs. lead for freight cars. The best journal bearing for general service is a good solid composition, lead lined.

9. Use 33 in. steel-tired wheels in passenger; and 33 in. cast-iron wheels in freight service, under our tenders. Experience with wheels over 33 in. in diameter is limited, but I am not favorably impressed with the 42 in. wheel.

10. We are troubled to some extent, by flanges of steel-tired wheels cutting away. We attribute it to the action of rails upon the soft and malleable tire, and make a practice of truing up and sizing wheel as soon as they show evidence of unequal wear; and we do not allow them to injure flanges, by running too long between turnings.

11. The nuts and split keys, hanger and cellar bolts, and all parts of trucks with steel wheels are kept tight with less work than with cast-iron wheels; and the life of truck is lengthened by their use.

12. Prefer good muck bar iron axles, and consider any first-class reliable axle safer than the ordinary steel axle. Under ordinary conditions, journals of iron give less trouble from heating, and when roughened from heating wear smooth sooner than steel. However experience with steel axles is not extensive.

Wm. Swanston (C., St. L. & P.).

1. Use the Pennsylvania standard freight truck under all tenders.

2. Use the same truck in passenger, freight and switching service.

3. Do not use any more care with tender trucks than with freight car trucks in fitting up new, but they are subject to closer inspection when in service.

4. We run 2,800 gallon cisterns on diamond freight trucks with the standard axle for 40,000 lbs. capacity cars, but for larger tenders we use the 60,000 lbs. capacity axle and the iron freight truck.

6, 7. Do not use dust-guards with our axles for 40,000 lbs. capacity, but we use a vulcanized fibre guard with the 60,000 lbs. capacity axle. The former has a journal 7 in. × 3⅝ in., the journal of the latter is 8 in. × 4 in.

8. Best results from brass with a soft metal lining about 1-16 in. thick to start with.

9. Use 33-in. wheels in our tenders for all kinds of service, 36-in. preferable for passenger service.

10. We have not used steel-tired wheels under tenders.

12. Prefer iron axle, having fewer hot boxes, and the journal boxes do not wear out as fast.

Clem Hackney (U. P.).

1. Blue print. We use side bearings only on hind truck.

2. Yes. 3. Just about the same.

4. Standard tender carries 2,900 gallons of water and 10 tons of coal. Trucks as per blue print takes care of this load on all our trains.

5. No trouble with this truck.

6. Dust guards of white wood with leather tacked on face.

7. 3¾ × 7 M. C. B. axle.

8. The following is our specification for tender and journal bearings; to be of new metal, composed of one part tin and eight parts ingot copper, covered on bearing side about 3-32 in. thick with fine babbitt as follows:

87.4 parts tin,
4.2 parts copper,
8.4 parts antimony.

100

9. Use steel tired and cast-iron wheels, prefer 33 in. diameter for all clases of service.

10. More troubled with flange cutting on steel-tired than on cast-iron wheels, caused by difference in character of flange of steel tire and cast-iron wheel.

11. No material difference.

12. A large number of Otis steel axles in service are giving good satisfaction. We are making our own axles now from assorted scrap. If we were going outside to purchase I would prefer mild steel.

John Mackenzie (N. Y. C. & St. L.),

1. Blue print. We use centre bearing on our standard truck.

2. No. 3. No. 4. No. 5. No.

6. A common board placed in the aperture in rear of box with a hole cut to fit the axle neatly.

7. 4⅝ × 8⅝ in. journal, 5 in. wheel fit, 4⅝ in. centre, 6 ft. 3 in. centre to centre of journal, 6 ft. 11 in. over all.

8. Copper and tin 7½ to 1.

9. 33 in. chilled wheel weighing 560 lbs.

10. A few steel tired wheels, have had some trouble with flange cutting, caused by the quality of metal.

11. No difference.

12. Prefer steel, because less liable to breakage.

John Player (Wisconsin Central). Blue print.

1. Standard truck is the Schenectady patent, and we are using side bearings on both the trucks.

2. Same truck for both freight and passenger service.

3. Fit all trucks for freight or tenders very carefully in order to have them run good.

4. Tenders carry 3,500 gallons water and 6 tons coal.

5. No defective points except the springs, and remedied that by adding two leaves to the spring.

6. M. C. B. journal box with dust-guards complete.

7. Journal and axle are M. C. B.

8 Brass lined with soft babbitt is the best journal bearing in use.

9. Use 33-in. cast chilled wheels in tender trucks both freight and passenger; for very fast passenger service would recommend 36-in. steel-tired wheel.

10. No steel-tired wheels under tenders; using steel-tired wheels under engine trucks, have found no trouble from flange cutting.

11. No material difference in life of truck using different kind of wheels.

12. Prefer hammered iron axles. Several steel axles have broken in service.

Your Committee fails of doing the duty it should, and the Association is deprived of much valuable information owing to the failure of the members to respond to our circular of inquiry. The few replies are valuable in themselves as they show good designs and construction fully meeting the modern requirements for high speed and capacious tenders, yet with so few roads to give us their practice we are unable to make any comparisons or do more than give in full the views of these gentlemen as they have presented it to us, and we think with their views and practice so clearly presented, nothing is left for your Committee to say further on the subject, unless we ask that the drawings of trucks furnished be illustrated in the Association reports if the expense for same can be afforded consistently.

E. M. ROBERTS,
H. L. GARRETT,
H. D. GORDON,
} Committee.

Mr. H. D. GORDON (Philadelphia, Wilmington and Baltimore): The Committee found that the diamond truck was in general use under tenders a few years ago, but increase in size and capacity of tenders and speed seems to render a stronger and better construction necessary.

Mr. SINCLAIR asked if swing beam trucks should be used under tenders.

Mr. JOHN MACKENZIE had found advantage in removing tires with cut flanges and mating them afresh, turning them to match.

Mr. GORDON had done the same thing, but considered that the wheels should be evenly worn, either both slightly worn or both badly worn. The two tires on one axle should be of similar hardness and density.

The report on Traction Increasers was then read.

TRACTION INCREASERS IN CONNECTION WITH OVER-CYLINDERED ENGINES.

The Committee reported as follows:

Only ten replies were received to your Committeee's circular, and to the query "Can the defect of an over-cylindered engine be best remedied by the application of a traction increaser?" all give an emphatic negative.

Some would prefer either bushing the cylinder or adding dead weight; others bush the cylinders with either cast iron or steel, and two prefer dead weight distributed over the driving wheels, because there is no additional mechanism, and with the permanent load the springs can be adjusted to suit. The additional power required to haul this dead weight is almost nothing, and as the old iron will credit nearly as much at the scrap pile as it cost at the foundry, the total expense will be very little."

In answer to the query, "Would you use traction increaser on six, eight or ten-wheel coupler engines?" four members say if used at all would use on all classes, and others say they do not recommend their use on any class.

If with a traction increaser applied, would they then dispense with the use of sand? All answer "No." Three reply that a traction increaser would practically lengthen the engine wheel base; one says the freedom of movement between tank and engine is destroyed, and one states its application increases the locomotive resistance on curves.

No member outside your Committee making reply to the circular has an engine equipped with a traction increaser, and the Committee not having had time or opportunity to carry out a trial, cannot say from direct experiment if the locomotive resistance moving over a curve is increased when a traction increaser is in operation.

Four members reply that if used at all they would use them continuously.

One member gives his experience as follows: "An engine fitted with a traction increaser, ordinary American type, four wheels coupled, 17 x 24 inch cylinders, 5 ft. 3 in. driving wheels, boiler pressure 135 lbs., total weight of engine 71,060 lbs., distributed as follows:

On trucks	27,130 lbs.
On drivers	23,130 "
On trailers	20,800 "

"The traction increaser was guaranteed to enable the engine to haul 33 per cent. greater load than formerly. In one experiment I rode on the engine myself. She hauled behind her 18 loaded and 22 empty cars, including the van, the usual load being 23 loaded cars. The engine hauled the load up the controlling grades of the division, but straining itself to such an extent that I was convinced that a traction increaser would soon send the engine into repair shop, and the results have shown that my conclusions were not unfounded.

"The traction increaser was applied in October, 1886, the engine at that time being in good order. In January, 1887, after having run 11,000 miles, with the traction increaser hauling heavy loads, the engine came into repair shop with a broken main frame, two broken horn blocks, broken saddle casting, broken right driving crank pin and broken cylinders. The fractures in the latter were close to the flange through which they are bolted to the saddle casting. These repairs were executed and the use of the traction increaser continued with a somewhat lightened car load. The following April the engine was returned to repair shop after having run 4,250 additional miles for a new axle and new right driving crank pin. It will thus be seen that the engine was severely damaged after having run but 15,250 miles with a traction increaser. The traction increaser remains on engine No. 172, but instructions have been issued not to haul more than the average load for engines of that class, and we have since then had no special trouble."

Two members state that their experience will not warrant any expenditure of time or money in further experiments with traction increasers.

J. DAVIS BARNETT.
F. L. WANKLYN.

Mr. S. DAVIS BARNETT explained that elaborate experiments on increasing adhesion by electricity gave but 8 per cent. increase of adhesion. As it was impossible to change polarity suddenly, the additional adhesion given by electricity when an engine is standing disappears when an engine is moving. An apparatus for increasing adhesion was now in use in England with good results, as the delivery of the sand could be easily regulated and made certain and effective. A jet of steam created an induced current of air, which drove sand on the rail just in front of the drivers, the speed with which the sand was propelled insuring its reaching the rail at the right spot.

Mr. JOHANN preferred a well-proportioned engine to one with a traction increaser.

A report on the magnetic influence on engineers' watches was then read.

Mr. G. W. STEVENS moved that the report be received and Committee continued. He objected to the bad precedent of allowing a representative of a patented article to address the Association.

The Committee on Subjects for Discussion at the next meeting was then appointed, as follows: Messrs. John Player, George Hackney and G. W. Gentry.

The Report on Wheels was then read, and the recommendations therein contained were adopted unanimously, 58 members voting.

REPORT OF COMMITTEE ON CHILLED WHEELS.

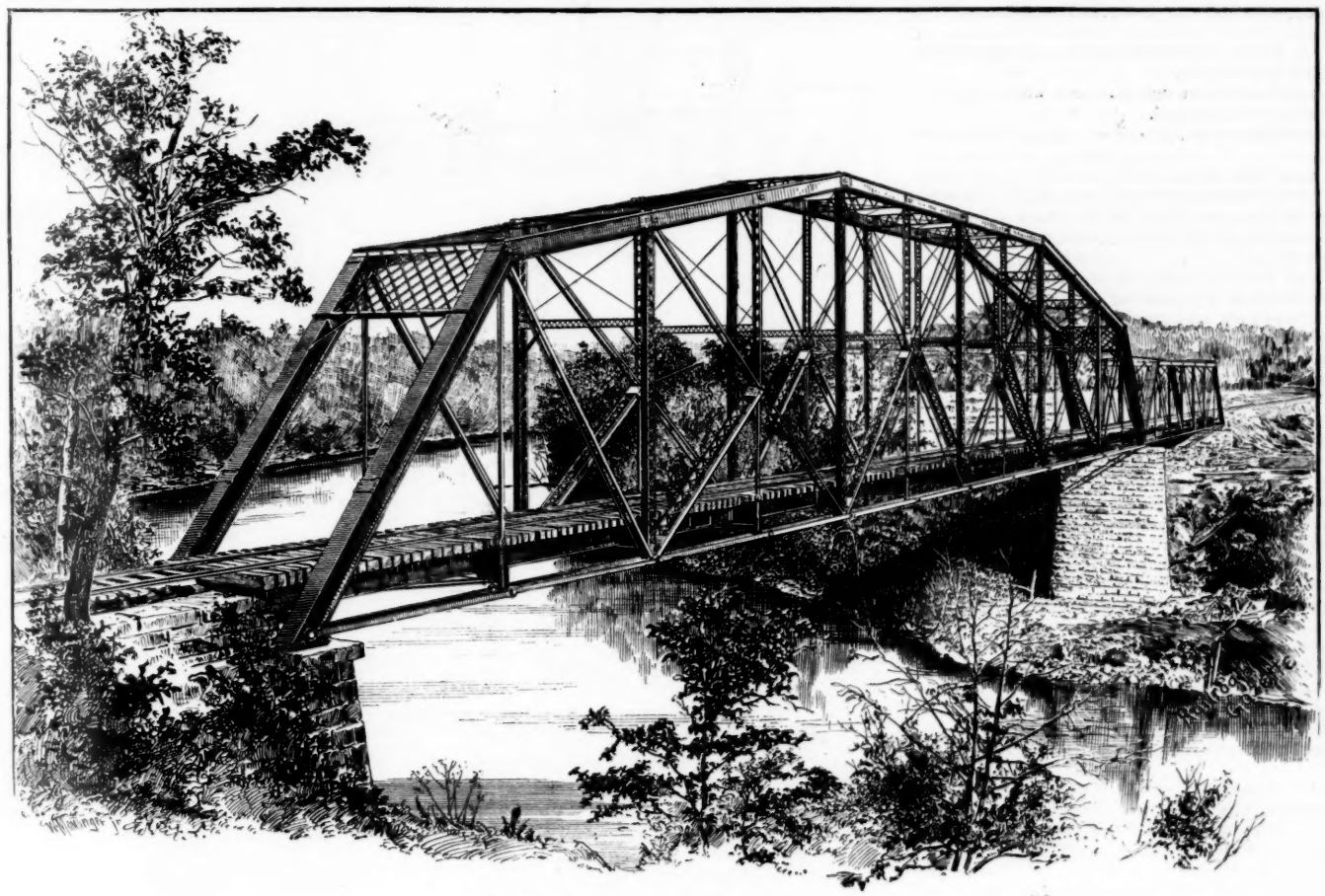
After conference with a like committee of the Master Car-Builders' Association and the Executive Committee of the Association of Manufacturers of Chilled Car Wheels, on the specifications, tests and guarantee of cast iron wheels, we make the following recommendations:

Specifications for Cast-iron Wheels.

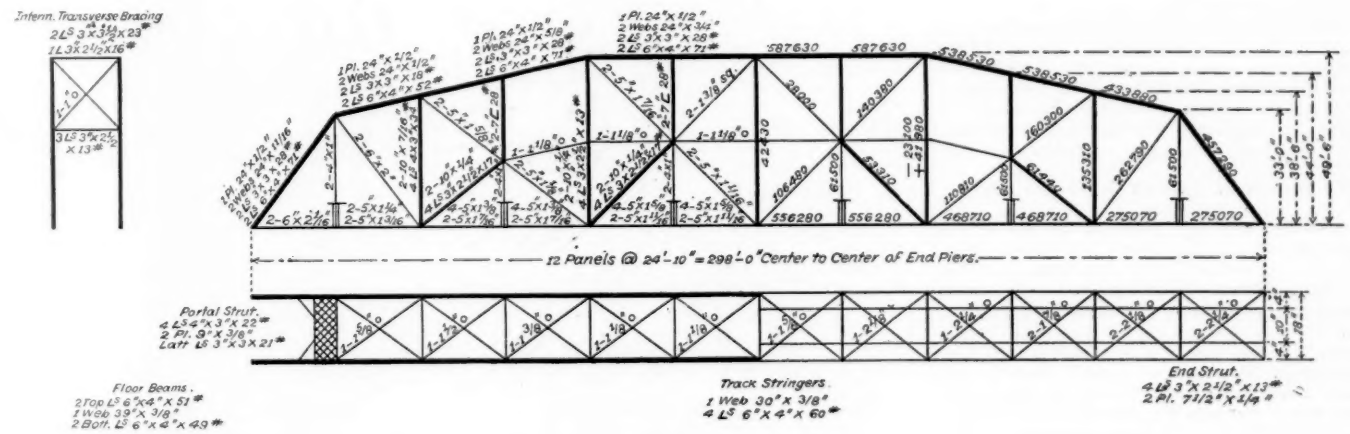
1. The chills in which the wheels of any one wheel maker are cast shall be of equal diameters, and the same chill must not vary at different points more than one-sixteenth of an inch in diameter.

2. There shall not be a variation of more than ⅛ in. in the circumference of any given number of wheels of the same nominal diameter, furnished by any one maker, and the same wheel must not vary more than $\frac{1}{16}$ in. in diameter. The body of the wheel must be smooth and free from slag or blow holes. The tread must be free from deep and irregular wrinkles, slag, chill cracks and sweat or beads in the throat which are ⅛ in. or over in diameter, or which occur in clusters of more than 6 in. in length.

3. The wheels broken must show clean, gray iron in the plates; the depth of pure white iron must not exceed seven-eighths of an inch or be less than three-eighths of an inch in middle of the tread, and shall not be less than three-sixteenths of an inch in the throat. The depth of the white iron shall not vary more than one-fourth of an inch around the tread on the rail line in the same wheel.



Perspective View, from a Photograph.



Strain Sheet.

BIG WARRIOR RIVER BRIDGE, MEMPHIS & BIRMINGHAM RAILROAD.

For Description, see page 424.

4. Wheels shall not vary from the specified weight more than two per cent.

5. The flange shall not vary in the same wheel more than 3-32ds of an in. from its mean thickness.

6. The single plate part of a 33-in. wheel, known as the Washburn pattern, shall not be less than ⅝ in. in thickness in a wheel weighing from 550 to 575 lbs., and not less than ¾ in. in thickness in a wheel weighing from 575 to 600 lbs.

Tests for Cast-iron Wheels.

1. For each hundred wheels which pass inspection and are ready for shipment, one representative wheel shall be taken at random and subjected to the following test:

The wheel shall be placed flange downward on an anvil block weighing 1,700 lbs., set on rubble masonry at least 2 ft. deep, and having three supports not more than 5 in. wide for the wheel to rest upon. It shall be struck centrally on the hub by a weight of 140 lbs., falling from a height of 12 ft. Should this wheel stand 5 blows without breaking into two or more pieces, the hundred wheels shall be accepted. Or, wheels must be of such strength that 550 to 575-lb. wheels shall require 20 blows, and 575 to 600-lb. wheels shall require 30 blows of a 100-lb. drop falling 7 ft. on the plate close to the rim to break a piece out—the wheel resting upon a cast-iron plate weighing not less than 1,000 lbs.

2. Should in either case the test wheel break into two or more pieces with less than the required number of blows, then a second wheel shall be taken from the same lot and similarly tested. If the second wheel stands the test it shall be optional with the inspector whether he shall test a third wheel or not. If he does not so elect, or if he does and the third wheel stands the test, the hundred wheels shall be accepted.

3. The above tests shall apply to standard weight wheels, from 26 in. to 42 in. diameter, used on standard gauge roads.

Form of Contract.

1. The party of the first part hereby agrees to furnish to the party of the second part, free on board cars at * * chilled cast iron wheels, * * inches in diameter under the following conditions.

2. The party of the second part hereby agrees to pay to the party of the first part * * dollars for each wheel furnished, and to keep an accurate record of the mileage made by the wheels placed in service under cars in passenger equipment and under locomotives and tenders, and an accurate record of the number of months of service of the wheels placed under cars in freight equipment.

3. The party of the second part hereby agrees, when any wheel furnished under this contract is scrapped, to furnish to the party of the first part a statement which will show—

1. The wheel number.
2. The service in which the wheel ran.
3. The amount of service in months or miles.
4. The cause of failure.
5. A charge against the party of the first part of fifty-five per cent. (55 per cent.) of the price of the wheel mentioned above.
6. A credit to the party of the first part of ..... cents per 1,000 miles for locomotives, tenders and passenger equipment, varying according to diameter, except in the case of wheels made flat by sliding, or removal for sharp flanges or other unfair treatment, which have not made sufficient service to balance the charge against the party of the first part as above; in such case a service credit shall be made which shall balance the charge.

4. The party of the first part hereby agrees that on presentation of the statement to pay to the party of the second part any balance due from lack of sufficient service on the part of the wheels (with above exceptions) to balance the charge; and the party of the second part hereby agrees to pay to the party of the first part any balance due as shown by the aforesaid statement, settlements to be made quarterly. It is, however, understood and agreed that no credit shall be allowed for excessive mileage for time service on freight wheels beyond the time guaranteed.

5. The party of the second part hereby agrees to hold subject to the inspection of the party of the first part, for a period of thirty days after the said statement has been rendered, any wheels (with above exceptions) which have not earned for themselves a credit equal to the amount charged against them.

Service Guarantee.

36 inch passenger wheels	70,000	miles.
33 " " "	60,000	"
36 " engine and tender wheels	60,000	"
33 " " " "	50,000	"
30 " " " "	45,000	"
26 and 28 inch engine and tender wheels	40,000	"
Refrigerator, through line and cattle cars	24	months.
All other freight cars	48	"

Settlements of claims for non-performance of guaranteed service shall be made upon the basis of mileage and time guarantee as above.

JAMES N. LAUDER,
GEO. W. STEVENS,
JAMES MEEHAN,
} Committee.

Mr. W. A. FOSTER (Fall Brook Coal Co.) asked if it was desirable to admit air at the bottom of hopper in extension smoke-box. He used permanent opening in the top of the hopper, and adjustable opening in the bottom, about 3 in. by 1½ in. He used it on consolidations to cool the engine down instead of opening the fire door. Sparks accumulate in hopper instead of smoke-box, and are discharged on the track at intervals of 15 miles by opening the adjustable opening at the bottom of the hopper. Found engine saved 20 per cent. of fuel, and made fewer sparks. Burnt bituminous coal screenings.

Mr. AMES had two openings, fire-door and bottom of hoppers.

Mr. SINCLAIR thought better results could be obtained with larger nozzles.

Mr. MACKENZIE had tried holes 1½ in. to 4 in., but found it prevented engine steaming, and dropping cinders on track was objectionable. When tried on an engine with 72 in. fire-

box, the hopper choked with cinders, and smoke-box was red hot.

Mr. W. A. FOSTER (Fall Brook Coal Co.) said the opening did best with large fire-box.

Mr. JOHANN had found a tight front end was essential to enable an engine to steam well.

Mr. EASTMAN asked if any one was using a feed-water heater?

Mr. PAXSON (Philadelphia & Reading) had found years ago that feed-water heaters did not give satisfactory results.

Mr. SINCLAIR suggested that a step be placed on pilots to enable an engine to be coupled safely, and moved a resolution to that effect.

Mr. ALLAN COOKE Chicago & Eastern Illinois) placed steps on pilots with perpendicular slats. The men could place their feet on the horizontal slats and therefore steps were unnecessary.

Mr. Sinclair's resolution was carried.

Mr. George A. Coolidge was made an honorary member and Mr. D. L. Barnes was elected an associate member.

The Auditing Committee reported the accounts correct.

Mr. HICKEY asked if fire-box water space was sufficient as now constructed. He considered circulation defective in present boilers, as both upward and downward currents were necessary. They had better be increased to 4 in.

Mr. PECK pointed out that increase in water space would decrease fire space.

Mr. SWANSTON thought water space ought to be increased gradually so as to give free circulation and longer stay bolts. The difference in expansion of inner and outer shell fractures stay bolts, but longer stay bolts would not bend so much.

The following places were suggested for the next meeting: Niagara Falls, Chautauqua Lake, Montreal, Saratoga and Pittsburgh. The three former received the highest number of votes, and consequently one of them will be selected as the next place of meeting,

The following officers were then nominated for the ensuing year:

President, J. H. Setchel.
Vice-President, John Mackenzie.
" " G. W. Stevens.
Treasurer, Geo. Richards.
Secretary, A. Sinclair.

Mr. Stevens declined, as he had no time for the duties of the office.

Mr. Lauder suggested that, as the duties were purely ornamental, Mr. Stevens would specially grace the position (laughter).

Mr. STEVENS said that Mr. Lauder's reasons strengthened his resolve to decline the position.

It was finally decided to re-elect the present Vice-President, Mr. R. H. Briggs, and consequently all the old officers were re-elected.

The Convention then adjourned, to meet the third Tuesday in June, 1889, at either Niagara Falls, Chautauqua Lake or Montreal, as may be selected by the Executive Committee.

The Big Warrior Bridge near Cordova, Alabama.

The consolidated lines now known as the Kansas City, Fort Scott & Memphis Railroad extend from Kansas City to Memphis, 487 miles, and the Kansas City, Memphis & Birmingham, operated by the same officers, and largely owned by the same interest, extends from Memphis to Birmingham, 251 miles.

The latter line crosses the Big Warrior River near Cordova, in Alabama. Two spans of a single track through bridge carry it over this stream. One of these spans is 150 ft. in length and of the ordinary parallel chord, Pratt type, while the other is 298 ft. long between centres of end pins. The latter is shown in the accompanying engravings.

Although it is not an extremely long span, it is far beyond the average length of ordinary railroad structures, and required in its design the consideration of features characteristic of economy in the heaviest railroad bridges. This road opens the West and Northwest to the coal and iron country of Northern Alabama, and the interchange of the heaviest kinds of freight traffic between those portions of the country is induced by it. Hence its bridge structures are required to be of the most substantial character and to meet unusual demands.

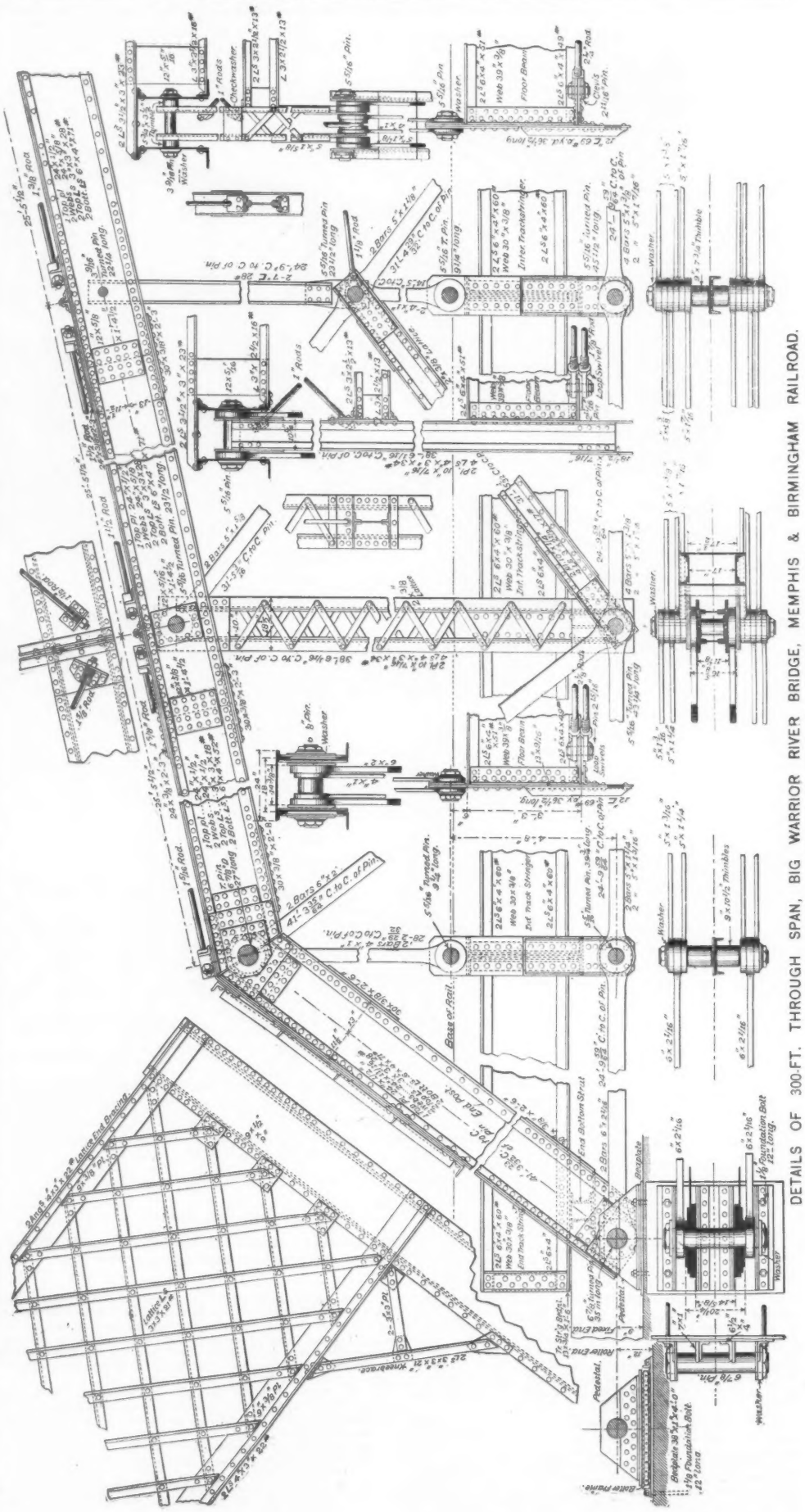
The general view and plans of details show in a complete manner all features of the design. The reduced depth at the ends of the truss is an economic feature which has long been recognized in the best engineering practice, but its combination with a single system of triangulation for the web members in long spans is of recent date and places this structure in the first rank of American bridges.

The entire structure is of wrought iron throughout, and every detail exhibits scrupulous care in its design. The floor beams are riveted between the vertical posts above the pins, and the longitudinal stringers are secured in the same manner between the webs of the floor beams. The maximum stiffness of floor is thus secured and the general stability of the span much enhanced. The complete upper and lower lateral and transverse systems, in connection with the heavy lattice portal bracing, insure the highest degree of stiffness and stability under high speed traffic, or even in cyclones.

The horizontal rod running longitudinally at mid depth of the trusses is for the sole purpose of preventing vibrations in the long posts of the web, and was not considered to affect in any way the column length of these posts.

This span was subject to a very severe test immediately after the removal of the falsework and before the rivets in the upper chord joints were driven. While these joints were temporarily bolted, it became imperatively necessary for the railroad company to pass trains over the bridge. Under these trying circumstances it carried its traffic in the most satisfactory manner.

The entire structure was designed, constructed and erected by the Phœnix Bride Co., for the moving load given in their standard specifications, and consisting of two coupled consolidation locomotives, each with its tender weighing 171,000 lbs., following by a train load of 3,000 lbs. per lineal foot. It was completed in the early autumn of 1887.



DETAILS OF 300-FT. THROUGH SPAN, BIG WARRIOR RIVER BRIDGE, MEMPHIS & BIRMINGHAM RAILROAD.
Designed, Constructed and Erected by THE PHŒNIX BRIDGE CO.

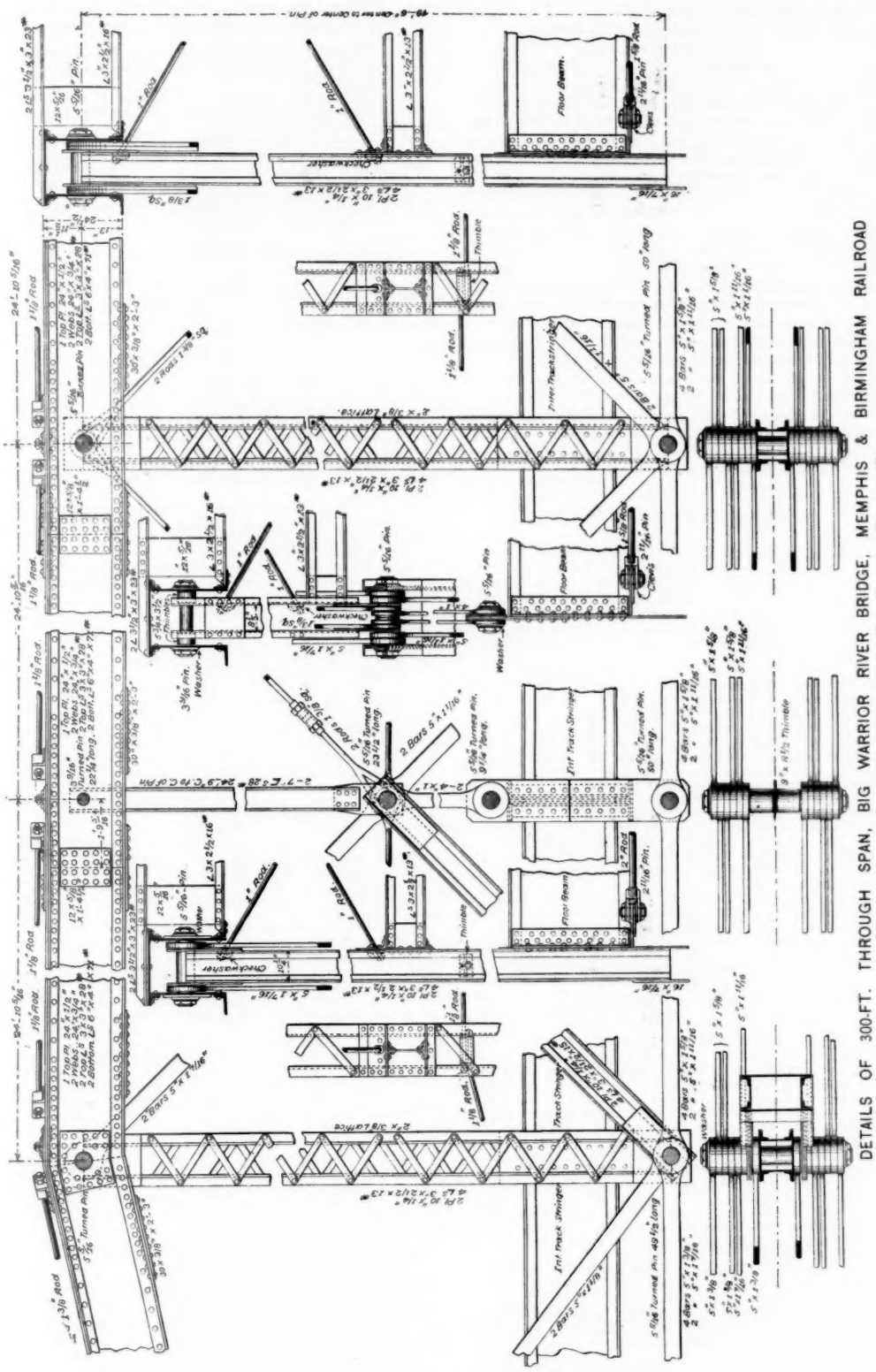
Car Accountants' Association.

THIRTEENTH ANNUAL CONVENTION.

After the election of officers for the ensuing year, as given in our last issue, the Convention took up the subjects for discussion in their regular order.

The Committee to wait on General Time Convention, F. J. Hoyle (E. T., V. & G.) Chairman, reported that the recommendation of the Atlanta Convention for per diem car service had been presented, resulting in the appointment of a special committee to investigate the subject, which committee had substantially indorsed the recommendation of the Car Accountants' Association; and that it would be finally acted upon at the fall meeting of the Time Convention.

The Committee on Carding Foreign Cars, D. F. Maroney (Baltimore & Ohio) Chairman, strongly recommended the adoption by all companies of the Home Route card as the best plan yet discovered for keeping foreign cars in their proper routes. Mr. Maroney explained in detail the system as worked by a number of prominent roads. The system in force on the West Shore during the past two years, and which was discussed briefly at the Atlanta convention, received special consideration. The special feature of this system is the furnishing of running slips or bills by agents for all foreign cars moved empty. These running slips are made from the Home Route



DETAILS OF 300-FT. THROUGH SPAN, BIG WARRIOR RIVER BRIDGE, MEMPHIS & BIRMINGHAM RAILROAD
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card on the car. In the absence of Home Route cards agents must ask the car accountant for proper route and card the car in accordance with his reply. Cars must have Home Route cards attached before being placed at loading platforms. The effect of the system is to always keep Home Route cards on foreign cars, and to place the responsibility for proper routing entirely with agents and yard masters.

The Committee on the Per Diem System, W. G. Wattson West Shore) Chairman, recommended for reindorsement the combined mileage and per diem system adopted at the Atlanta Convention in April, 1887, and at present in force on about 25 roads. The report of the Committee was accepted, but considerable opposition to its adoption was at once manifest, quite a large number of members signifying their preference for a straight per diem system. On the suggestion of Mr. Halsey (Western N. Y. & Penn.), the Chair made a special request that each and every member express himself freely and furnish all the data possible upon this important subject.

Mr. RENNIE (D., L. & W.) stated that his company had been operating the mixed system since Feb. 1, and had enjoyed very good results; the performance of their cars showing a small but steady increase. They would, however, very much prefer the straight per diem plan at 35 cents per day. Mr. Rennie had no argument to present favorable to the straight per diem system as compared with the mixed system for general adoption, viewed from a strictly car service standpoint, but based his preference on the fact that comparative estimates showed the straight per diem system would produce the larger credit balances for his company.

Mr. COOK (N. Y., L. E. & W.) stated that he represented one of the pioneer per diem roads, and that after eight months' trial he could earnestly indorse the mixed system as one which in operation would decrease the detention of cars at stations and generally expedite movement. He was under the impression, although he had prepared no figures, that the straight per diem system at 30 cents per day would be the most advantageous to his company so far as car service balances were concerned, but he thought the mixed system would recommend itself to the greater number of roads, and as the prompt return of their cars was the most important consideration with them, the general adoption of the per diem system and consequent better movement, was more to their interest than the car service balance.

Mr. WILDER (Atchison, Topeka & Santa Fe) stated that his company was not yet ready to adopt either plan; but should they decide to do so, the straight per diem system would be their preference.

Mr. CHEESEBRO (Wabash) stated that his company was not ready to go into per diem in any form at present, and personally he saw no necessity for it. If every road would properly organize its car service department with energetic men at the head who would look after their own cars carefully, and see that foreign cars in their jurisdiction were treated fairly, the present mileage system would be found to give satisfaction. Until there was a nearer approach to uniformity in the number of cars to the mile of road owned by all the roads of the country, the per diem system could not meet with general favor. He produced carefully compiled information on this point from a large number of roads. His company owned only 7 cars per mile of road, while the Eastern trunk lines owned from 18 to 30. How could his company be expected to co-operate in a system looking to higher rates with such odds against them?

Mr. WATTSON replied that he admired the courage of any one that could venture a word in favor of straight mileage in the light of the fact that during the past ten years under this system the object for which equipments have been increased has been steadily defeated by the decreasing performance of cars, until the movement has been reduced to the miserably low figure of from 17 to 25 miles per car per day. Car tracing at arm's length with courtesy as the ruling incentive to action always was a farce, but the fact is more generally acknowledged now than ever before, and it is not surprising that advocates of the system are becoming less numerous. What is needed is a system that will provide an incentive for every road to send every other road's cars home as quickly as possible, and instead of one road tracing to another road without authority to enlist action, the tracing should be confined to home roads where we have authority. With regard to the number of cars per mile of road, it would seem that the number of tons of freight to be moved by the respective roads becomes a most important factor. A road 100 miles long and carrying 10,000,000 tons of freight per year would require about as many cars as a road 500 miles long moving the same tonnage.

Mr. TAYLOR (Cleveland & Marietta) said his road was one of the short ones, and notwithstanding the fact that so much had been said favorable to the mixed system for short roads, his company was in favor of straight per diem. His principal business, however, consists of a through haul of about 90 miles, and 90 per cent. of the cars are returned empty immediately after discharging lading, resulting in heavy mileage per car per day, under which circumstances the road would pay less car service under straight per diem.

Mr. CAVANAGH (Northern Pacific) stated that his company would prefer the straight per diem system at 50 cents. The Northern Pacific is a long line, making large mileage per car per day.

Mr. HIGBIE (Central of New Jersey) said his company, after several months' experience, was heartily in favor of the per diem plan, either mixed or straight. The result on his line was solid trains of their own cars, whereas formerly foreign cars were largely used. Now he gets his cars back promptly, and is able to utilize them for home business.

S. H. CHURCH (Superintendent Transportation, Southwestern System, Pennsylvania Co.) stated that the car service balances had thus far been against his company, but that their car performance was increasing, and they would continue the mixed system in strong hopes of its ultimate adoption by roads generally. He believed the system to be entirely practicable, and thought that in operation great improvement in car performance must result.

Mr. E. YARDLEY (Superintendent Transportation Pennsylvania Co., Northwest System) coincided with Mr. Church, and submitted a statement showing average performance of cars of per diem roads on his system and of his cars on per diem roads as follows:

	Per diem cars on P., F. W. & C. Miles per day.	P., F. W. & C. cars on p. d. roads. Miles per day.
December	17	...
January	22	18
February	25	20
March	25	28
April	28	26

Mr. TROUT (Toledo & Ohio Central), read a paper strongly advocating straight per diem on the ground that the accounting would be simplified and the plan could be worked at less cost. Also, that the larger amount per day required under that plan would prove a great incentive for moving cars promptly.

The most valuable statement in the interest of car service reform was made by Mr. C. H. Ewings, of the New York Central. This road, it will be remembered, withdrew from the mixed per diem system on May 1, after three months trial, and there has been much speculation as to the cause of its withdrawal.

Mr. EWINGS states that for the three months ending April 30 his road lost in car service balances over the mileage system $15,223.13, or $5,024.38 per month. Of this loss 68.5 per cent. was with coal roads, which roads insisted upon supplying their own cars for lading originating on their own line so far as their own cars would go, and the quicker movement of these cars on the Central through operation of the per diem system simply resulted in a larger supply to the coal roads of their own cars to the exclusion of N. Y. C. coal cars. There was no question about the efficiency of the system to increase the performance of cars; it would result ultimately in handling the same tonnage with considerably less cars, but the Central did not feel like doing purely missionary work for six months, or until final action is taken upon the question by the General Time Convention. The New York Central is heartily in favor of the mixed system, provided it is pretty generally adopted, and they have reason to believe that it will be a great improvement over the present mileage system. Under straight per diem at 25 cents, the loss to the Central for the three months referred to would have been $22,335, or $7,445 per month. Mr. Ewings submitted the following statement showing car perfo :

	N. Y. C. cars on per diem roads. Miles per day.	Cars of p. d. roads on N. Y. C. Miles per car per day.
February	35.6	22.4
March	35.3	21.7
April	36.6	27.4

In answer to a question as to whether he thought 15 cents per day sufficient incentive to move cars promptly, Mr. Ewings replied that on his line it amounted to about $25,000

per month, and that was sufficient incentive for them, certainly.

Mr. BLAKESLEE (Lehigh Valley) said his company was well satisfied with results from working the mixed system.

Mr. MCKINNON (Burlington & Mo. River) favored straight per diem.

Mr. HOYLE (East Tenn., Virginia & Georgia) said his company would be guided by the action of the General Time Convention.

Mr. TERBELL (Fall Brook Coal Co.) said they had been well pleased with the mixed system, but after the withdrawal of the Philadelphia & Reading and the New York Central, their principal connections, there was but little object for them to continue the system.

The discussion brought out the fact that about two-thirds of the 90 members present favored the straight per diem system, but the only argument presented by them was that the car record offices could be maintained at less cost, and that the necessarily higher per diem rate would prove a greater incentive for moving the cars. On the other hand, nearly all the representatives of the roads now operating the mixed system favored its continuance, and supported their argument with figures showing a steady increase of car performance, which is the one great object sought after.

Mr. WATTSON (West Shore) in closing the discussion thought the straight per diem plan a weak one because its advocates, though generally skillful at argument, had made out but a poor case. The idea that all the expense of keeping a mileage record could be saved if straight per diem were adopted, is fallacious. Railroads require many statistics made from car mileage and train mileage, and these records could not be discontinued. The movement and location of cars would have to be kept even more carefully than now, so as to prevent delays. Clerical expense is, however, insignificant compared with the question, Will the system be equitable? Performance is the main point. One road hauls a car 400 miles in two days and another occupies the same time in hauling it ten miles and unloading it; for both to pay the same sum is unjust, as the longer road collects ten times as much revenue on the goods as the other. The long road having utilized the greater percentage of car performance it should pay for car service accordingly. Cars more than pay for themselves at ¾ cents per mile. The only object in adopting any per diem charge is to abolish unnecessary delays, and the combined system will do this without injustice to any. It is more favorable to the small roads than straight per diem would be, and it is the duty of this convention to indorse the plan. Mr. Wattson offered the following resolution, which was adopted unanimously.

Resolved, That it is the sense of this convention that the continuance of the combined mileage and per diem system is in the direction of car service reform, and we earnestly recommend its adoption by all roads, leaving the question of superiority as compared with the straight per diem plan to be decided hereafter on the basis of statistical facts. Resolved further that each company will furnish a statement to the Per Diem Committee of this Association by Sept. 1, 1888, showing the service of its cars on foreign roads and the service of all foreign cars on its own road for the months of October, 1887, March and July, 1888. [In the form shown in the *Railroad Gazette*, June 15, p. 388.]

A member referred to the necessity of simplifying the

Initials.

work of car record offices and conductors by removing from cars all initials except those of the road owning the car and those of the fast freight line to which it may be assigned. A number of roads allow the initials of other roads to be placed on their cars for advertising purposes. For instance, 100 C., I., St. L. & C. cars have recently been marked on one end "C., N. O. & T. P.; Queen and Crescent Route." The result is that cars are sometimes reported as C., I., St. L. & C., and sometimes as C., N. O. & T. P., thus confusing the records and making double entries for the same car. The matter was referred to the Master Car-Builders' Association.

Demurrage.

There was some discussion as to what system is necessary to force the prompt loading and unloading of cars. It was generally agreed that a small demurrage charge is necessary and that the per diem system must naturally be supplemented by such charge; hence the way to improvement in this respect is through the adoption of the per diem system. Mr. MITCHELL (Kansas City, Fort Scott & Memphis) stated that his company was obtaining splendid results by billing $5 against each loaded car as an arbitary. If the consignee unloaded the car within twenty-four hours from time of arrival, the arbitrary was omitted. If unloaded within 48 hours, $4 was remitted; 72 hours, $3; 96 hours, $2; 120 hours, $1. If not unloaded within five days the whole amount is collected. Mr. McKinlon stated that the demurrage bureau inaugurated in Omaha some time ago had about broken up car detention in that city, thereby obviating the necessity of increasing yard facilities.

THE EFFICIENCY OF THE CAR SERVICE OFFICE: HOW CAN IT BE IMPROVED?

Several very interesting papers were read on this subject.

Mr. FELLOWS (Bee Line) stated that the time had now come when car service had advanced beyond a mere bookkeeping business. There is about as much money to be made or lost through the proper or improper administration of the car record office as in any other sub-department of a railroad The car record office is the place for checking the switching revenue of the road, also for effecting the prompt movement of all special fast freight, live stock, etc., through a system of reports to the general superintendent or manager, showing the runs in detail and locating detentions. This office should keep watch of all cars sent out in yards or at way stations for repairs, etc. Much valuable information on this general subject was elicited in informal discussions and comparison of notes outside the regular sessions of the meeting.

MISCELLANEOUS BUSINESS.

The name of the association was changed, and will hereafter be known as "The Car Service Association."

It was resolved that hereafter three full days, with a morning and afternoon session, must be set aside for the business of each annual convention, and that no invitations for excursions or other social affairs will be accepted until after the business of the convention is concluded.

The next annual meeting of the Association will be held at Mackinaw Island, Mich., on the third Tuesday in June, 1889.

The members of the Association were favored with marked courtesies on all sides. The Grand Trunk ran a special train from Toronto for the western delegates and their families, and gave them a boat ride down the Lachine Rapids and an excursion over the Victoria tubular bridge. The Canada Atlantic took them by special train to Ottawa and dined them at the Russell House there. The Canadian Pacific took them to Quebec and back by special train, and the Windsor Hotel, of Montreal, the headquarters of the members, "threw in" an elegant banquet, at which 150 sat down. There was also a banquet given by Mr. John G. Hunt, car distributor of the Grand Trunk, and his accomplished wife, at the St. Lambert's Boat Club. A large proportion of the members participated in these festivities.

Train Accidents in May.

COLLISIONS.

REAR.

1st, in St. Paul, Minn., a St. Paul, Minneapolis & Manitoba passenger train which had come to a stop and sent back no signal was run into by a Chicago, St. Paul, Minneapolis & Omaha passenger train, telescoping 2 sleeping cars of the former and damaging engine, baggage and express cars of the other train.

1st, on New York, Lake Erie & Western, at Middletown, N. Y., a passenger train ran into the rear of a freight train, damaging engine, caboose and 1 car.

1st, on New York, Pennsylvania & Ohio, near Jamestown, N. Y., freight train ran into a preceding freight, wrecking engine, caboose and 6 cars; 1 trainman injured.

3d, on Central Pacific, near Vallejo, Cal., passenger train ran into a freight train which was going on to a siding. Engine and a tank car were derailed and damaged.

3d, on Pennsysvania, in Camden, N. J., a passenger train was backed into a locomotive, derailing the latter.

5th, night, on Hannibal & St. Joseph, at New Cambria, Mo., a freight train ran into a preceding freight, wrecking engine, caboose and 12 cars. The wreck caught fire and was partially consumed. Two trainmen and a man in the caboose were injured.

5th, night, on Rochester & Pittsburgh, near Bradford Junction, N. Y., freight train broke in two and the rear section ran into the forward one, wrecking 17 cars.

6th, 11 p. m., on the Philadelphia & Reading, at Locust Gap, Pa., freight train broke in two and rear portion ran into the forward one, wrecking several cars. One car was loaded with dynamite and exploded with terrific force, demolishing 17 dwelling houses and damaging many other buildings. Of the sleeping occupants of the 17 houses, 8 were killed and 25 injured.

7th, on Southern Pacific, near Sand Cut, Cal., the foremost engine of a southbound freight train was disabled in ascending a heavy grade and the train, unable to proceed, after a time started to back down to the last station. Before getting into much headway, however, it was run into on a curve by a special northbound freight train, and 3 engines and 10 cars were piled up in a bad wreck, which caught fire and was partially consumed.

8th, night, on Chicago, Rock Island & Pacific, at La Salle, Ill., a switching freight train ran into the rear of another freight, demolishing the caboose. Two tramps asleep in the caboose were killed.

8th, on New York, Lake Erie & Western, near Salamanca, N. Y., freight train drawn by two engines ran into the rear of another freight, damaging the forward engine and the caboose.

8th, on Richmond, Fredericksburg & Potomac, near Richmond, Va., a construction train ran into the rear of a freight train, wrecking engine and several cars.

9th, at Binghamton, N. Y., a New York, Lake Erie & Western freight train ran into the rear of a Delaware, Lackawanna & Western freight, wrecking caboose and derailing engine and several cars.

9th, on Philadelphia & Reading, near Hamburg, Pa., a coal train ran into the rear of a freight train, and an engine, caboose and 20 cars were piled up in a bad wreck, which was fired by the stove in the caboose and partially consumed; 2 trainmen injured.

9th, on Mobile & Girard, near Columbus, Ga., construction train broke in two and rear section ran into forward one, wrecking 5 cars.

10th, on Geneva, Ithaca & Sayre, near Ithaca, N. Y., a passenger train, brought to a stop on account of the air brake hose having become disconnected, was run into by a closely-following coal train, wrecking the engine and two passenger cars. The engineer of the freight and two passengers were injured; all the other passengers had got out of the cars.

11th, 8 a. m., on New York, Lake Erie & Western, at the junction of the main line and Newark branch, near Jersey City, N. J., an east-bound passenger train which had just come to a stop was run into by a following passenger train, damaging engine, telescoping two cars and injuring fifteen passengers. The rear brakeman did not go promptly with a flag, and the approaching train was running too fast.

11th, on Central Vermont, near Bethel, Vt., a freight train ran into a wood train standing on the main track, wrecking both engines and six cars; water boy killed and brakeman injured. The freight was running too fast.

12th, on Fremont, Elkhorn & Missouri Valley, near Arlington, Neb., freight train broke in two and rear section ran back down grade and collided with a following freight train, damaging engine and wrecking several cars.

14th, about 3 a. m., on Atchison, Topeka & Santa Fe, at Fountain, Col., a rear collision happened in this wise: A freight train which had stopped to do some switching at Colorado Springs left the caboose and 4 cars standing on the main track. The brakes on the cars were released, it is said, by a mischievous tramp, and they ran back down grade 12 miles into the head of a passenger train standing at Fountain. Several cars were completely demolished and thrown on top of the engine and baggage car, injuring the fireman. Naphtha was sprinkled over the débris by the bursting of a tank car next to the caboose and fire immediately enveloped the wreck and adjoining buildings. The last of the runaway cars contained giant powder and a terrific explosion followed. Many adjacent buildings were destroyed, 4 persons killed and 20 injured. That portion of the passenger train behind the baggage car was detached and run back to a safe distance.

14th, on Norfolk & Western, near Wakefield, Va., a freight train ran into a preceding freight, wrecking engine and 13 cars; 2 trainmen injured.

15th, on Baltimore & Ohio, at Fredericton, O., a special passenger train collided with a freight train backing upon a side track, damaging both engines.

19th, on Chicago & Iowa, in Aurora, Ill., an empty engine ran into the rear of a freight train, doing some damage.

19th, on East Tennessee, Virginia & Georgia, at Dalton, Ga., freight train ran into a preceding freight, damaging engine, caboose and several cars.

21st, on Baltimore & Ohio, at New Haven, O., a freight train descending a grade broke in two and rear section ran into forward one, wrecking 10 cars.

21st, on East Tennessee, Virginia & Georgia, near Waring, Ga., a freight train broke in two and the rear section ran back into a following freight train, wrecking engine and several cars. Engineer injured by jumping.

23d, on Burlington & Missouri River, at Halloran, Neb., passenger train ran into the rear of a freight train, damaging engine, caboose and 4 cars.

23d, on Denver & Rio Grande, at Trinidad, Col., a special passenger train collided with a freight train standing on the main track, partially telescoping a dining car; an employé was seriously injured. It is said that the air brakes on the special train failed to work properly.

28th, on New York, Lake Erie & Western, at Union, N. Y., a freight train ran into the rear of another freight, damaging engine and caboose.

29th, on New York, Lake Erie & Western, at Union, N. Y., a freight train ran into a preceding freight, damaging engine and several cars.

31st, on Centaal Pacific, in the snowsheds near Summit, Cal., a passenger train ran into the rear of a standing freight train, damaging an engine, caboose and several cars, and injuring a trainman.

31st, on Pennsylvania, at Deep Cut, N. J., a freight train ran into a switching engine, doing considerable damage; 1 trainman injured.

BUTTING.

2d, on Southern Pacific, at Whitewater, Cal., butting collision between a passenger train and a freight which was going into a siding, wrecking both engines.

2d, on Louisville & Nashville, near Suluria, Ala., butting collision between two freight trains, owing to a misunderstanding of orders, wrecking both engines.

3d, on Jacksonville & Southeastern, at Sorrento, Ill., butting collision between a passenger train and a freight, wrecking both engines and damaging several cars of each train. Two passengers were killed and 4 seriously injured.

4th, on Northern Pacific, near Cheney, W. T., butting collision between the second section of a west-bound freight and an east-bound extra freight. Both engines were wrecked and 7 trainmen injured. It is said that the first section of the west-bound train neglected to carry a flag.

8th, on Kansas City, St. Joseph & Council Bluffs, at Amazonia, Mo., butting collision between two freight trains, disabling both engines and damaging several cars.

9th, on New York, Pennsylvania & Ohio, at Concord, Pa., butting collision between two freight trains, wrecking both engines; fireman killed.

16th, on New York, Lake Erie & Western, near Hinsdale, N. Y., butting collision between two freight trains, wrecking both engines and derailing 10 cars.

16th, night, on Chicago, Milwaukee & St. Paul, in Chicago, Ill., a freight train ran over a misplaced switch into another freight. Both engines were damaged, one of them, with a coal car, being run off the end of a spur track.

17th, on Georgia Pacific, at Muscadine, Ala., butting collision between a passenger train and a freight train wrecked the engines and several cars of each train, injuring 2 trainmen.

17th, on New York, Lake Erie & Western, at Hinsdale, N. Y., butting collision between two freight trains, wrecking both engines and several cars. It is said that an operator failed to give orders to one of the trains.

18th, on St. Louis, Iron Mountain & Southern, at Texarkana, Ark., butting collision between a passenger train and a freight train damaged both engines; 2 trainmen injured.

18th, on East Tennessee, Virginia & Georgia, at Cohutta, Ga., butting collision between two freight trains, damaging both engines and 3 cars.

22d, on Burlington & Missouri River, at Humboldt, Neb., a freight train ran over a misplaced switch and into the head of a passenger train, damaging both engines.

22d, on Chicago, Rock Island & Pacific, near Iowa City, Ia., butting collision between two freight trains, wrecking both engines and 20 cars, and injuring both engineers.

22d, on Milwaukee, Lake Shore & Western, at Hurley, Wis., a freight train ran into another freight standing on the main track, damaging both engines and several cars.

24th, on Central of Georgia, near Atlanta, Ga., butting collision between two passenger trains, due to a misplaced switch, damaging both engines.

25th, on Baltimore & Potomac, near Alexandria, Va., butting collision between two freight trains, doing considerable damage; 2 trainmen killed.

25th, on Georgia Pacific, at Eden, Ala., owing to a misplaced switch a freight train ran into the head of a passenger train standing on the side track, damaging both engines and several cars.

25th, on Chicago & Northwestern, near Stanwood, Ia., butting collision between two freight trains wrecked both engines and several cars. A tramp stealing a ride was killed.

26th, on Chicago & Iowa, at East Aurora, Ill., butting collision between a passenger train and a freight train, damaging both engines; 1 trainman injured.

26th, on Chicago, Milwaukee & St. Paul, at Brookfield, Wis., butting collision between two freight trains, damaging both engines and several cars.

28th, on Columbus, Hocking Valley & Toledo, near Nelsonville, O., butting collision between two freight trains, doing some damage.

28th, on Evansville & Terre Haute, near Terre Haute, Ind., butting collision between two passenger trains, damaging both engines.

28th, on New York, Ontario & Western, near Hancock, N. Y., butting collision between two freight trains, due to a confusion of orders, wrecking the engines and 8 cars.

28th, very early, on Atlantic & Pacific, near Walnut, Ariz., butting collision between a freight train and a light engine, wrecking both locomotives and 12 cars; 1 trainman killed, 4 seriously injured.

29th, on Louisville & Nashville, near Louisville, Ky., butting collision between two passenger trains, owing to a misplaced switch, damaging both engines.

30th, on Union Pacific near Bordeaux, Wyo., butting collision between the detached engine of a passenger train going to a washout and a work train. Both engines were badly wrecked; 3 trainmen killed, 2 trainmen and 4 laborers injured. The work train had repaired and passed over the washout, which the passenger men understood to be impassable.

CROSSING AND OTHER.

8th, in Binghamton, N. Y., a New York, Lake Erie & Western passenger train ran into a Delaware, Lackawanna & Western freight train at the crossing, derailing engine and several cars and throwing the caboose down an embankment.

19th, on New York, New Haven & Hartford, at Milford, Ct., an east-bound freight ran into a freight switching on the main track. Both engines and several cars were damaged.

25th, on Chicago & Northwestern, at Clinton, Ia., a switch engine ran into the side of a moving freight train, wrecking 7 cars.

30th, on Chicago & Northwestern, at East Madison, Wis., engine of switching freight collided with another engine, doing some damage. The engines were going in the same direction and came together at a switch.

DERAILMENTS.

DEFECTS OF ROAD.

2d, on New York Central & Hudson River, at Penfield, N. Y., a car in a freight train was thrown from the track by a defective switch.

2d, on St. Louis & San Francisco, near Paris, Tex., engine and 9 cars of a freight train went through a bridge which had been weakened by heavy rains, and were wrecked.

4th, on Houston & Texas Central, near Hutchins, Tex., as a gravel train was moving backward the engine was derailed (the track being bad) and broke away from the tender; fireman killed, engineer and brakeman seriously injured.

6th, early, on Milwaukee & Northern, near Floodwood, Mich., a freight train went through a bridge, the foundations of which had been weakened by freshet; the engine and 8 cars fell into the Michigamme River and two trainmen were killed.

16th, on Columbia & Puget Sound, at Franklin, W. T., caboose and 4 cars of a freight train thrown from the track by the spreading of the rails, and wrecked.

22d, on Texas & Pacific, near Lodi, Tex., engine and 10 cars of a stock train went through a trestle, making a bad wreck; fireman killed, engineer injured.

23d, a. m., on Hannibal & St. Joseph, near Cameron, Mo., a freight train was precipitated into a swollen stream by a weakened trestle bridge.

23d, about 4 a. m., on Wabash Western, near Cameron, Mo., a freight train was precipitated into a swollen stream by a weakened trestle bridge. This derailment happened within a few minutes after that on the Hannibal & St. Joseph, noted above, the bridges of the two roads being parallel and adjacent to each other, and the wrecks of both were piled together in an indescriminate mass. A brakeman of the train first derailed went back to signal the Wabash train, but was run over and killed by it. One brakeman went down with the first train and was instantly killed. Two tramps on the Wabash train were fatally injured, and two others riding in cars of the Wabash train were either drowned or scalded to death.

28th, on Southern Pacific, at Redwood City, Cal., engine of switching freight thrown from the track by the spreading of the rails.

31st, on Burlington, Cedar Rapids & Northern, near Rock Rapids, Ia., several cars of a mixed train were thrown from the track by a broken rail, injuring conductor and 3 passengers.

DEFECTS OF EQUIPMENT.

4th, noon, on Pennsylvania, at Wayne, Pa., an east-bound freight train was derailed by the breaking of an axle. Three cars containing oil were broken and the oil caught fire and ran along the tracks, destroying 17 cars. A brakeman was badly burned.

8th, on Philadelphia & Reading, near Wyndmoore, Pa., as a passenger train, consisting of engine and 4 cars, was running rapidly by a side track a casting on a brake-beam under the third car broke and lodged in a frog, derailing two cars and throwing one of them down an embankment. One trainman and 2 passengers were slightly injured.

8th, on New York, Lake Erie & Western, near Belmont, N. Y., car of a construction train was derailed by a broken journal.

8th, on Corning, Cowanesque & Antrim, near Westfield, Pa., 3 cars of a freight train were derailed and wrecked by a broken wheel.

11th, on Columbus, Hocking Valley & Toledo, near Brunning, O., an overloaded car in a freight train broke down and several cars were wrecked.

13th, on Cincinnati, Hamilton & Dayton, at Lima, O., 5 cars of a freight train were derailed by the breaking of a draw-bar. A tramp asleep in one of the cars was fatally injured.

14th, on New York, Lake Erie & Western, near Darien, N. Y., a truck under a car of a freight train broke down and 17 cars were badly wrecked.

15th, on Philadelphia & Reading, in Philadelphia, Pa., locomotive derailed by a broken wheel and thrown against an embankment; fireman seriously injured.

17th, on Northern Central, near Starkey, N. Y., 15 cars of a freight train were derailed by the dropping of a brake-beam.

19th, on Covington & Macon, near Round Oak, Ga., engine of passenger train was derailed and overturned by the breaking of a wheel of the forward truck; engineer injured.

21st, on Georgia Pacific, near Eastaboga, Ga., 2 cars of a passenger train derailed and damaged by the breaking of a truck.

22d, on New York Central & Hudson River, near Herkimer, N. Y., forward truck of engine of a passenger train derailed by a broken wheel.

22d, on Pittsburgh, Ft. Wayne & Chicago, near Lucas, Pa., an axle under a car of a freight broke and 3 cars were derailed and wrecked.

31st, on St. Louis, Arkansas & Texas, near Belden, Tex., rear car of a passenger train derailed by a broken truck and badly damaged.

NEGLIGENCE IN OPERATING.

10th, on New York, Ontario & Western, at Oxford, N. Y., coal train ran into a hand car loaded with steel rails, and the engine and 6 cars were derailed and thrown down an embankment; fireman seriously injured.

13th, on West Shore, at Rotterdam Junction, N. Y., engine and 12 cars of a freight train derailed by a misplaced switch.

14th, on Boston & Maine, at Medford Junction, Mass., engine and 1 car of a passenger train derailed by a misplaced switch.

15th, on New York, New Haven & Hartford, at Bridgeport, Ct., the engine of an east-bound passenger train was derailed at the derailing switch at the approach to the draw-bridge. The combined interlocking and block signals at this point had just been put in use, and, the apparatus not working properly, the man in charge signaled to enginemen with a flag. The runner of the derailed engine acted on a clear signal which was intended for a train moving in the opposite direction.

15th, on Northern Pacific, near Superior, Wis., freight train derailed by a misplaced switch, wrecking engine and 10 cars.

17th, on Grand Trunk, at Orchard Lake, Mich., engine of a freight train derailed by a misplaced switch and overturned, fatally scalding the engineer. It is said that the switch was left open by section men making repairs.

18th, a. m., on New York, New Haven & Hartford, at South Norwalk, Ct., a passenger train, consisting of engine and seven cars, derailed by a defective joint as it entered upon the draw span of a bridge. The whole train except the two rear cars ran off the rails, the engine running about 300 ft. on the sleepers. The joint at which the derailment occurred was a mitred joint, to lap over from the draw to the fixed span. The rails of the draw had to be lifted whenever the draw was opened and apparently had not been replaced in proper position. The first wheel of the approaching engine pushed the left to one side and also tore up the next two or three rails.

23d, on Manhattan Elevated, at Rector street station, New York City, a switch was misplaced under a switching passenger train, derailing two cars and damaging a corner of the station platform.

26th, on Chicago, Milwaukee & St. Paul, at Portage City, Wis., freight train derailed by a misplaced switch.

UNFORESEEN OBSTRUCTIONS.

2d, on Mobile & Girard, near Columbus, Ga., a freight train ran over some horses, and the engine and 9 cars were derailed and ditched.

2d, on Chicago & Northwestern, at Sycamore, Ill., a freight train was derailed by a misplaced switch and dashed into a Chicago, St. Paul & Kansas City freight train, on an adjoining track, damaging engine and several cars. It is supposed that the switch was purposely misplaced.

3d, night, in Chicago, Ill., as a Chicago, Burlington & Quincy freight train was entering the Louisville, New Albany & Chicago yards, a switch was maliciously thrown under the train and 6 cars were derailed. At the same time a car in the middle of the train was set on fire and burned up. The conductor of the train was attacked by three men and badly beaten.

4th, night, on Pennsylvania, near Bolivar, Pa., a passenger train drawn by two engines struck a large tree which high winds had blown down across the track, derailing the entire train and wrecking both engines.

6th, on Cleveland & Pittsburgh, near Mikanna Station, Ohio, a circus train ran into a landslide and the engine and 5 cars were derailed and piled up in a bad wreck. A circus man was killed; engineer severely injured.

11th, on Bennington & Rutland, near Danby, Vt., tender and several cars of a passenger train derailed by a washout, the tender was overturned and 2 trainmen and 1 passenger injured.

12th, on Chicago, St. Paul, Minneapolis & Omaha, near Sprague, Wis., 8 cars of a freight train were derailed and wrecked by cord wood falling upon the track from a car in the train.

12th, on Maine Central, near Bath, Me., passenger train ran into a landslide; engineer and fireman slightly injured.

12th, on Maine Central, near Sewall's Cut, Me., a passenger train ran into a landslide and was derailed, damaging tender and several cars.

14th, night, on Fort Worth & Denver City, near Clarendon, Tex., passenger train derailed and engine and several cars wrecked at a point where the track had been washed away by a waterspout; fireman killed, engineer badly hurt.

14th, early, on Philadelphia & Reading, at Lost Creek, Pa., a special freight train, consisting of engine and 2 cars, was derailed by a rock which had been maliciously wedged into a frog. The whole train went down an embankment, and 1 trainman was killed and 2 badly injured.

15th, on Missouri Pacific, near Concordia, Kan., passenger train ran into a drove of horses, and the engine was thrown from the track and overturned.

17th, on Chicago & Northwestern, near Negaunee, Mich., a freight train ran over a cow and 13 cars were derailed and piled up in a bad wreck.

17th, on Chicago & Northwestern, near Goose Lake, Ia., a freight train ran over a cow and 12 cars were derailed and wrecked.

20th, on Florida Railway & Navigation Co.'s road, near Tallahassee, Fla., passenger train derailed by a washout, injuring a trainman.

21st, on Georgia Pacific, near Atlanta, Ga., engine and 9 cars of a freight train were derailed and wrecked; 1 trainman killed, 1 injured. It is said that an obstruction had been placed upon the track.

26th, on Central Iowa, near Oskaloosa, Ia., a freight train ran into a herd of cattle, and the engine was thrown from the track into the ditch, killing the engineer.

29th, on Concord, near Epsom, N. H., a freight train ran over a cow, and the engine and several cars were derailed and thrown down an embankment.

29th, on New York, Lake Erie & Western, near Wellsburg, N. Y., freight train ran over some horses, caught on a bridge, and engine and 15 cars were derailed and wrecked.

UNEXPLAINED.

5th, on Southwestern, near Montezuma, Ga., 12 cars of a freight train were derailed and piled up in a bad wreck.

5th, on Wisconsin Central, near Prentice, Wis., 12 cars of a freight train were derailed and wrecked.

8th, on New York, Lake Erie & Western, at Campville, N. Y., freight train derailed.

12th, on Southern Pacific, at Gila Bend, Ariz., several cars of a passenger train were derailed on a low trestle and tipped off; 1 passenger killed, 2 seriously and several others slightly injured.

12th, on New York, Lake Erie & Western, at Port Jervis, N. Y., 2 cars of a freight train were derailed and thrown down an embankment.

13th, on Burlington & Missouri River, near Lincoln, Neb., several cars of a freight train were derailed and ditched.

14th, on New York, Lake Erie & Western, near Alden, N. Y., 10 cars of a freight train were derailed and wrecked.

15th, on East Tennessee, Virginia & Georgia, near Elk Valley, Tenn., engine of passenger train derailed and thrown down an embankment; engineer seriously and fireman slightly injured,

15th, on Chicago, Milwaukee & St. Paul, near McGregor, Ia., car in a passenger train derailed and overturned, injuring a passenger.

15th, night, on Denver & Rio Grande, near Salida, Col., passenger train derailed on a curve, the baggage and express cars being percipitated into a cañon, the smoking car thrown across the track, and three passenger cars overturned. One trainman and 12 passengers injured.

15th, on Manhattan Elevated, near 129th street, New York city, a car of a passenger train was derailed, and demolished a small adjoining structure.

15th, on New York & New England, at Dedham, Mass., several cars of a passenger train were derailed.

16th, on Delaware, Lackawanna & Western, at Hoboken, N. J., car in a freight train derailed, damaging a bridge.

16th, on West Jersey, near Sea Isle City, N. J., several cars of a mixed train derailed. A truck got out from under one of the cars and derailed those following it.

19th, on Wabash, at East St. Louis, Ill., a car of a freight train derailed.

19th, on Wabash, in East St. Louis, Ill., engine of passenger train derailed.

21st, on Florida Railway & Navigation Co.'s road, near Jacksonville, Fla., 2 cars of a passenger train derailed on a trestle.

21st, on Delaware, Lackawanna & Western, at Scranton, Pa., car of passenger train derailed.

23d, on Western of Alabama, near Selma, Ala., a freight car of a mixed train was derailed and thrown across the track.

24th, on New York Central & Hudson River, at East Rochester, N. Y., 3 cars of a freight train derailed.

25th, on South Florida, near Tampa, Fla., freight train derailed.

26th, on Mobile & Birmingham, near Jackson, Ala., engine of accommodation train derailed and overturned in the ditch, killing the fireman.

29th, on Fall Brook Coal Co.'s road, near Waterville, Pa., engine and 26 cars of a coal train derailed and ditched.

OTHER ACCIDENTS.

1st, on New York, Lake Erie & Western, near Suffern, N. Y., engine of a freight train broke a parallel-rod, the loose end demolishing the cab, injuring the engineer.

3d, on Pittsburgh & Western, at Wallace Run, O., a car in a passenger train struck a hoisting crane which hung too near the track, breaking a number of windows; 1 passenger was severely cut by broken glass.

7th, on Manhattan Elevated, near Desbrosses street station, New York City, cylinder head of a locomotive was blown out.

10th, on Elmira, Cortland & Northern, at Chicago, N. Y., engine of passenger train damaged by striking a truck loaded with a large log, which, owing to a loose portion of the chain fastening the log to the truck having caught on the track, could not be hauled out of the way.

13th, on Baltimore & Ohio, near Rawlins Station, Md., engine of a freight train exploded its boiler, killing engineer and fireman.

24th, on Richmond & Danville, in Atlanta, Ga., the reservoir of a Baker heater exploded on a car standing at the depot, slightly injuring 3 passengers.

29th, on Louisville & Nashville, near Franklin, Ky., engine of a freight train exploded its boiler, wrecking several cars; engineer killed and 2 other trainmen injured.

A summary will be found in another column.

THE SCRAP HEAP.

Caste in America.

Conductor (in smoker, fortissimo): "Tickets, tickets; come, now, get your tickets ready." [Punches savagely.] Conductor (in common car, forte): "Tickets, tickets." [Punches loudly.] Conductor (in parlor car, piano-forte): "If you please, sir Thanks, very much. Yes, ma'am. Beg pardon! Your ticket, please. Sorry to disturb you, sir—ah—thank you." [Smothers noise of punch in his hands.]—*Matthews-Northrup Guide.*

Railroad Exhibition in Austria.

The Austrian Railway Exhibition in Vienna contains an interesting and comprehensive collection of all and every apparatus, carriage or car used by Austrian railroads from their first beginning until the present time. Besides these various specimens the respective length of lines and most important bridges, viaducts and other engineering works are well demonstrated. The most interesting division is perhaps the one in which the rolling stock from first to last is shown. The clumsy engine of the North Railway, dated 1841, and the post-coachlike carriage of even an earlier date, look strange side by side with the magnificent steam engine, "1888," and a saloon carriage having an outside terrace for the use of passengers and supplied with all the latest improvements as to safety and comfort. There is also a transport carriage for wounded soldiers, containing the most elaborate collection of instruments and every article in use in a first-class hospital, the whole belonging to the Austrian Samaritan Society. A state railway wagon, for the temporary electric illumination of stations along the line, is also noteworthy. Its object is to facilitate the taking up and dispatch of large numbers of soldiers and matertals.

Striking Back.

A dispatch from North Vernon, Ind., reports a peculiar accident at that place. John Moneyref, night watchman for the Ohio & Mississippi Railroad, while assisting in transferring baggage, caught hold of a satchel and tossed it into the baggage car. As he did so a loud report was heard and Moneyref reeled to the platform wounded in the left breast from a ball which was discharged from a pistol in the satchel. His injuries are believed to be serious.

A Good Prospect for Car Builders.

A Boston dispatch of June 26 states that Judge Allen, in the Massachusetts Supreme Court, has decided that a pass given by a railroad to a man and his "family" as consideration for land conveyed to the road, the pass being valid as long as the land shall be used for railroad purposes, is good forever. Mr. Dodge, of Attleboro, made such an agreement with the Boston & Providence, and now his granddaughter claims to be one of the family, and the judge supports her position. How long it will be before the increase of passenger traffic will necessitate third and fourth tracks on this road has not been figured out by the arithmetician of the court.

The Burlington Engineers.

The Brotherhood of Locomotive Engineers held a meeting in New York City last Sunday, which was addressed by Messrs. Arthur, Sargent and Hoge. It was stated that the Burlington road was paying its new engineers higher wages than it formerly paid the Brotherhood men, and that "high-priced pilots" still have to be employed. A resolution was passed pledging every member of the Brotherhood to contribute $5 monthly for the support of the Burlington strikers.

The firemen and engineers in St. Paul have passed a series of resolutions, denouncing the Democratic committee of that city for going to St. Louis over the Burlington road, and asserting that none of them will support the nominees of the Democratic convention.

The Boundless West.

Passenger: "Conductor, how far are we from Kansas City?" Conductor: "We're there now, sir: just past Eight Hundred and Fiftieth street." Passenger: "How soon will we get to the station?" Conductor: "It's about an hour's ride."—*Matthews-Northrup Guide.*

Gentlemen Won't; Others Mustn't.

A New York *Tribune* reporter has been snubbed by a "Trunk Line." He says the conductor refused to reverse a seat for him, saying that under the rules it could now be done only for ladies. Men will put their feet on the plush. "Ten new cars had been spoiled in two months" by big, big, black grease spots.

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

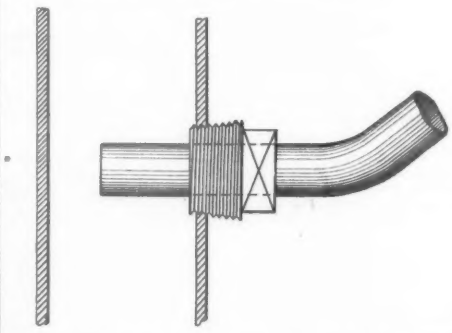
Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The report of the Car Accountants' Convention at Montreal, which we give on another page, is a paper well worth reading and is not so long as it appears. This association has some clear-headed leaders and it is doing good work. It is somewhat surprising to find so decided a sentiment in favor of simple per diem, but it is plain that many, perhaps nearly all, who have thus far taken action have been governed by the narrow view that it would probably be immediately profitable, or at least not unprofitable, to their own road. The final vote of the meeting, however, will lead to much study and enlightenment, and we may confidently expect that rational and scientific ground will be taken by men so earnest and intelligent. With the information outlined in the resolution the committee will be enabled to make a thorough report to the Time Convention next fall on the question of equity between the two systems, and it is to be hoped that there will be no hesitancy in promptly furnishing the information asked for. The Pennsylvania road proper, which has taken, perhaps, more enthusiastic interest in the reform than any other company, was not represented at the convention; but at a meeting of the car accountants of the per diem roads held in Buffalo a month ago its representative stated that excellent results were obtained from the mixed system. The Pennsylvania's object in adopting the system was to increase the number of cars available for business on its own line by more prompt return from foreign roads; and the road now enjoys the use of about two thousand more cars per day than at the same time last year. This good result is credited to the per diem plan. The action of the Montreal meeting on the junketing question was eminently sensible. The entertainments this year were numerous and enjoyable, and the temptation was no doubt strong to resolve—inwardly, at least—to have a similar good time every year, but the Association bravely resolved to place business before pleasure.

A passenger on a railroad train must be provided with a fair amount of patience. This has just been judicially laid down. A man bought a ticket on a buffet car. Shortly after the train started, he asked the porter to make up his berth, but the attendant replied that he could not do it until he had served two lunches which had been ordered by other passengers in the car. The passenger was wroth and called for the conductor, demanding of him whether he was on an eating or a sleeping car. The conductor said that it was both; that the rules required that orders from passengers should be filled in the order given; that his bed should be made as soon as the porter furnished the two lunches ordered before he had asked for his bed, and directed the porter to make his bed as soon as he got through. The angry passenger demanded that his bed should be made then and there, or that his money be refunded. The conductor refused to refund the money, but said his bed should be made as soon as the porter got through with the orders on hand. The passenger declaring that he was treated abusively, left the car, went forward, and sat up all night. It was proved that all the berths were made by 9 o'clock, and that the porter made this passenger's berth as soon as he finished furnishing the two lunches previously ordered. In a Mississippi court the passenger brought a suit against the Pullman Company and got a verdict. But the Supreme Court holds this was all wrong; tells the passenger he was too hasty, and even quotes Scripture to him. "Whatever unpleasantness he encountered," says the Court, "appears to have been brought about as the direct and natural result of his own conduct. He had no right to have his bed made instantly, as demanded, under the circumstances; and as it was made ready in good time, and he chose not to use it, as he might, he can blame no one but himself for the discomfort of sitting up all night. The rudeness complained of in the altercation with the servants of the appellant sprang naturally from the manner and language of the appellee, and furnish an apt illustration of Solomon's proverb, 'An angry man stirreth up strife.'"

The exhibit of various new patented articles at the conventions of the Master Car-Builders' and Master Mechanics' Associations is gradually becoming a marked feature of the annual gathering of the railroad mechanical world and the exhibits this year in novelty, importance and number certainly surpassed those of any former year. In many classes, notably that of car seats, the exhibits marked the considerable advance made in railroad practice in this department, and it is to be hoped that within the next few years comfortable car seats, efficient and tight car doors, strong and simple trucks that will keep square, journal boxes which will exclude dust and not oil the track, brake beams which will stand to their work, and other much needed improvements will be in general use. The exhibition of such appliances adds greatly to the usefulness of the conventions, and we trust that the exhibitors will in the near future be enabled to make some more satisfactory arrangement to display their wares to better advantage. When crowded together in the most primitive manner on a hotel piazza, any proper inspection is difficult, and the merits of the majority of the exhibits deserve a better field in which to display their good points.

One of the most important resolutions passed at the recent Master Mechanics' Convention was that in favor of the brick arch in the fire-box of bituminous coal burning locomotives. The excellent results given by a properly designed brick arch have long been recognized by a few master mechanics in this country, and during the last few years the brick arch has been more widely tried, with the result that its merits have at last received what may be termed official recognition. One of the speakers, in the discussion on this subject at the convention, stated that he was convinced that the disadvantages of the arch outweighed the advantages. The whole gist of the question is contained in this criticism. While few have ever denied that the brick arch effected an economy in fuel and diminished smoke and sparks, many found that arches required frequent repairs, blocked access to the flues, damaged the sheets when the engine was blown off, and that the fall of an arch added another to the many causes which bring about a failure of the engine on the road. Most of the speakers gave accounts of the methods they have found successful in obviating these disadvantages. The use of thick bricks, an arch of considerable rise, and means of support which keep the bricks several inches clear of the fire-box sheets were the principal points insisted on by various speakers.



Mr. Lauder, of the Old Colony, gave an account of his method of securing the ends of the tubes which support the brick arch. This method could hardly be understood from the verbal description given at the meeting, but is clearly explained by the accompanying sketch. The ends of the tube are skimmed up on the outside in a lathe, and a taper brass plug is bored to a sliding fit. When this plug is screwed into the tube sheet, the brass is compressed sufficiently to make a tight fit on the tube. The tube is prolonged into the tube sheet sufficiently far to reach a supply of solid water and avoid the bubbles of steam rising from the sheet. This projection into solid water was adopted because some tubes had burnt out, evidently from an insufficient supply of water, but it may be doubted whether this was not caused by the tubes becoming accidentally choked from pieces of detatched scale, waste, etc., loose in the boiler. The bubbles of steam detach themselves pretty forcibly from the heated surface of a vertical plate and do not run parallel with it until they are some distance away from it. The method of securing the tube appears, however, to be good, and is certainly cheap and simple.

The Rail Head and Wheel Flanges.

It will be remembered that in some recent contributions to the *Railroad Gazette* Mr. W. Howard White has taken the ground that there is no loss of power involved in the use of a rail head with the sides considerably inclined to the vertical, while Mr. Millholland has gone further and taken the positive ground that there is actual gain in hauling power with the flaring head, and much less rapid wear. He therefore suggested, (*Railroad Gazette*, April 13) a rail head two inches wide on the top and with sides inclined 20 degrees.

To some of our objections to the propositions of Mr. Millholland and Mr. White, the former replies in a letter which appears in another column, the publication of which has been unavoidably delayed. In this latter communication our correspondent's views are summed up in the conclusion that the "natural lines of wear" give the greatest wear and the least resistance.

It must be admitted that where wear occurs between a wheel flange and a rail head, the surfaces in contact mutually wear each other. It follows from this that the shapes of both surfaces at any particular stage of this progressive action depend only upon their original shapes, their relative hardness, and the way they are rubbed together. To obtain the effect of curve wear alone, we should find a wheel which had run only on curves of a particular radius. In actual cases the shape of the flange results from both curve and tangent wear, while that of the rail is from all the wheels of both slow and fast trains. But since the flange and rail wear occurs *mostly* on the curves, we may discuss the problem as though it all occurred there, and then modify our conclusions to adapt them to the actual conditions.

The diagrams in Mr. Millholland's communication show a driver flange inclined some 30 degrees and a rail head some 6 degrees to the vertical. When these two surfaces have mutually ground each other to a common angle, should we not expect that this common angle would be an average of the two original slopes, or, say, 18 degrees from the vertical? If they were equally hard, and if each was ground only by the other on this curve, the final slope of both would be 18 degrees. If the rail be harder than the flange, this final slope would be less than 18 degrees, and *vice versa*. But the case is not so simple.

Part of the wear of the flange occurs on tangents, where the rail approximately maintains its normal shape (the pening of the head constantly replacing the wear of the flange), and so the fillet is worn out more here, resulting in making the inclination of the driver flange less than that of the rail on the curve. On the other hand, the car wheels, with their chilled flanges, will tend to wear off the upper corner of the rail, and give it a slope approximating their own, and so the angle of the head is made greater than that given to it by the drivers.

Thus it is seen that from both of these modifying causes the angle of the rail would come to be greater than the mean, and that of the flange less than the mean of these two original angles. But the *principal* influence still is the mutual action between rail and driver flange, and so the final angle will be nearly the mean between these two original angles. If the rail head had been originally vertical, and the flange angle originally say 20 degrees, then the final angle of the rail would doubtless have been something more than 10 degrees, and of the flange something less than 10 degrees. The final angle of the flange will partly be determined also by the degree of the curve, so that on a 20-degree curve, it may be that so low an angle as 10 degrees would never be reached in a flange, whatever the normal conditions may have been.

We therefore conclude that there is no general truth in Mr. Millholland's "natural line of wear," which he puts at 20 degrees with the vertical, but that it was simply a result found in certain limited conditions.

Irrespective of the objection which we have made to the extreme inclination of the sides of the head as contributing to the danger of mounting the rail the shape is erroneous for several other reasons. One is that it would concentrate the metal nearer the neutral axis, where it is not needed and cannot add materially to the strength of the rail, and because it would result in a narrow top surface. The heads of steel rails should undoubtedly be made wider and shallower. The reason why the tractive force is greater in new rails and wheels is because the wheel rests only on a *point*. Of course it always does rest on a *surface*, but with new wheels or rails this surface surrounds a point, while with rails and wheel-treads which are worn to each other, the surface in contact is much greater. Any newly-turned driver on a new rail must cause a distortion of one or both at the point of contact beyond the elastic limit, which is but another way of saying that it *crushes* the metal, or "bites" into it, and so obtains a greater tractive force. This exception is always stated in works on friction, and hence there is no such conflict between "theory" and fact as Mr. Millholland seems to find.

With regard to the statement that a locomotive hauls a greater load when wheel and rail are much worn than when either has its normal shape, we are inclined to think it is a matter which experiment only can satisfactorily determine. But assuming that it is the case, may it not be explained by the tendency the driver has to climb or mount the rail on its fillet, resulting in a grinding action there, which is so much *work* for the locomotive to perform. The driver probably does not really lift itself from the tread, but the tendency to lift has to be overcome by the grinding down of both rail and wheel at this point. It is quite conceivable that this resistance might be more than the side flange friction when rail and flange become worn to fit each other.

Tail Lights.

A proper and satisfactory settlement of all the questions regarding rear signals for trains, either night or day, is one of the things that the Time Convention has not attempted. A good rule was made and incorporated in the uniform code, but the prescribing of distinctive signals to indicate the kind or class of the train, or the track it is traveling upon, which has long been deemed desirable, if not necessary, by many of the best officers, was not attempted (except in the case or switching engines). The coutrary ideas and varying conditions of different roads, having one, two or four tracks, could not be adjusted when there were so many other important considerations engrossing attention. Possibly questions in which a majority of the members are only faintly interested can never be settled by the convention as a body, though they undoubtedly might be discussed with profit.

There are now a good many miles of road on which the primitive practice of simply showing something red at the rear is far from adequate. Double-track roads have gradually lengthened their sidings until they now, in innumerable instances, extend from one station to another or form recognized sections of third main track. On a track of this kind a freight train cannot adjust its tail signals as it would on a short turnout, because it has to move considerable distances and is likely to be followed by other freight trains on the same track. The increase of these sidings till they form a separate system of tracks, as on the Pennsylvania, or the use of two parallel double track roads for 300 miles, as does the New York Central, intensifies the reasons for having distinctive signals. Many single track roads run parallel to other roads for considerable distances, where a runner is often dependent wholly upon his own wits to distinguish trains of his own from those of the neighboring road. The Illinois Central has six parallel tracks of its own, and the Pennsylvania four-track system has in one place two main tracks of another road alongside of it. It is true that the conditions are such in nearly or quite all instances of this kind that a collision from mistaking a tail signal is very unlikely; such juxtapositions are generally in level country, so that there are few sharp curves, and there are numerous peculiarities about trains that enable runners to guess their identity. Moreover, the large and busy roads naturally have the best men and the best safeguards, and the block system, if in use and never neutralized by a blunder, will protect trains perfectly, even in the absence of all tail signals so far as the engineers are concerned. Nevertheless, there are important reasons for improving the present practice. The principle of never showing red to an engineman except when he positively must stop at once, which has received so much intelligent discussion by the most advanced operating officers, is not easy to maintain where there are more than two main tracks, but it should not therefore be lost sight of. The modifications necessitated by the changed conditions are not so great as they may seem.

In deciding upon appropriate tail signals, daylight

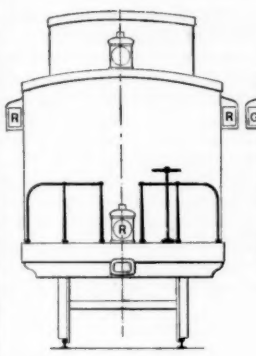


Fig. 1.—Passenger Train on Passenger Track.

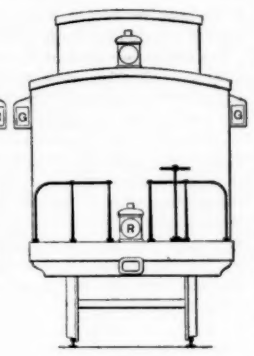


Fig. 2.—Passenger Train on Freight Track.

practice ought to be considered as well as lights and lanterns, for the numerous extremely dirty flags of undistinguishable color that are still in use unmistakably indicate that careful attention is not bestowed upon this point; but, as lights are in many respects more important than flags, it is perhaps well to drop the latter for the present.

Present practice is almost as variant as the minds of

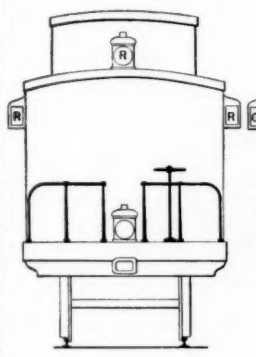


Fig. 3.—Freight Train on Passenger Track.

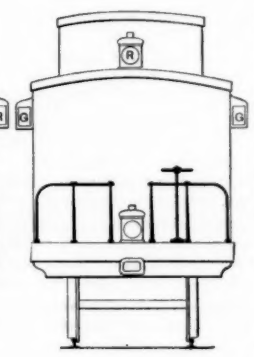


Fig. 4.—Freight Train on Freight Track.

the officers who control it. The uniform code specifies green markers, but it does not say in which direction they are to show. Where square lanterns with bull's-eye lenses are used, the prevailing practice seems to be to show green toward the front and sides, and red to the rear. With common lanterns hung on the side or set on the roof of a car each color shows in all three directions. We shall consider

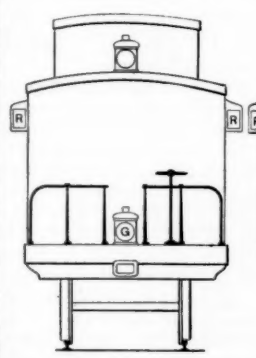


Fig. 5.—Passenger Track, N. Y. C. & H. R.

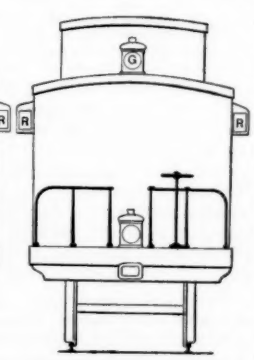


Fig. 6.—Freight Track, N. Y. C. & H. R.

here only those colors which show to the rear.

The New York Central (see figs. 5 and 6) gives no indication of the kind or class of train, but shows the track it is upon by the position of a green light visible to the rear. An objection to this is the inconvenience of affixing a light to the roofs of most passenger cars. This point should, of course, be provided for, as passenger cars may frequently be run upon freight tracks. The Illinois Central indicates through passenger trains by two red lights 4 ft. apart horizontally; suburban passenger trains (generally on separate tracks from the former) by two red lights about 10 ft. apart (on the corners of cars); and freights by three red lights in a horizontal line, one on each side and one in the middle, the latter hung from the roof of the caboose. The rules seem to make no provision for indicating the track a train is on.

Some roads prescribe ways of indicating the speed of trains by lights at the rear. One plan is to set a red and a white lantern on the rear platform; the former on the left and the latter on the right, indicating that the train (freight) is moving at its usual speed, while the red on the right, with the white on the left, shows that the train is slackening. Another plan, in use on the Pennsylvania, employs a square lamp with white, green and red glasses in its several sides. When running at normal speed the brakeman shows white to the rear; when slackening, green, and when stopped, red. Automatic flash lights, to be operated by the wheels, and pushing a red glass up in front of a white light at intervals regulated by the frequency of the revolutions of the wheels of the caboose have been devised.

The ideal light shows the kind of train and the class of track, at least. Showing the speed is not so easily attained, unless it be by some mechanical device like that mentioned. Variation in color is the first resource thought of, but, unfortunately, the longer red and green monopolize the field the stronger seems to be their hold upon it. Additional experiments with other colors only confirm railroad men in their adherence to these two alone. With only two colors, form must be resorted to. Experiments have shown that an oblong object (like a semaphore blade) is the easiest discernible, or rather distinguishable, at a distance; and no doubt an oblong transparency, to be placed in a vertical, horizontal or inclined position would be one of the best devices for a tail signal; but in this case the expense is as great an obstacle as are the laws of light and color in the other. The final resort must be combinations of lights—oblong figures with only the ends shown.

The showing of a difference between trains must always be subordinate to the primary object, which is to show danger; and so long as red is so universally regarded as *the* one symbol of danger, as it is at present, it may be assumed that any differentiating scheme, to be acceptable, must show red somewhere. Granted that it is perfectly safe and practicable to run trains without any red lights whatever, still the practice will not be changed.

A very simple and logical scheme is shown in figs. 1, 2, 3, 4. This provides for a four-track road and for two classes of trains on either track. Something like this will probably be adopted by the Pennsylvania, whose road between Jersey City and Philadelphia will soon be four-track throughout, with the exception of a few short stretches in cities. It will be seen that the distinction between tracks, the most important difference, is shown by double lights and by *color*; the most dangerous color, so to speak, on the track having the most fast trains. The distinction between trains, which is less important, is shown by the *position* of a single light. Passenger trains need never show a light on the roof. A passenger runner encountering a freight train on the passenger track, the most dangerous contingency to be considered, is confronted by the most striking triangle of the four; the light that shows the train to be a slow one is in the highest position, and all three of them are red. In case of a necessity for giving additional indications, as on a six-track road, or on adjoining lines of different companies, or for showing more than two classes of trains, there is ample room for additional lights, as the rules of the Illinois Central, quoted above, will suggest.

That trains should be uniformly designated by some such plan as this, needs no argument. If the cost of doing it were great, it might, perhaps, be reasonably objected to; but that two or more lights should be exhibited on the rear of all trains at night is now generally conceded. Every road, single track as well as others, owes it to neighboring roads to have its trains designated in such a manner as to never deceive the trainmen of other lines for an instant. It would be no great trouble to designate the front of trains as well as the rear, and it would often be a convenience. Train signals in general need closer attention than they receive. The rule requiring red or green signals to be carefully hidden when carried on any vehicle except the last is often diregarded and gives an appearance of confusion, at least. To see red lights or flags on a tender when the engine is attached to a train indicates slipshod notions on the part of the runner, if not of the superintendent. The rule to leave some light exposed when a train has wholly cleared the main track and the danger signals are covered should not be abandoned because of other complications arising. Merely to see a light disappear is not a positive all-right signal, such as the runner of a fast train is entitled to.

May Accidents.

Our record of train accidents in May, given in this number, includes 63 collisions, 75 derailments and 7 other accidents; a total of 145 accidents, in which 43 persons were killed and 158 injured.

These accidents are classified as follows:

COLLISIONS:		
Rear	32	
Butting	27	
Crossing and other	4	
	—	63
DERAILMENTS:		
Broken rail	1	
Loose or spread rail	3	
Broken bridge	5	
Defective switch	1	
Broken wheel	4	
Broken axle	3	
Broken truck	3	
Fallen brake	2	
Broken draw-bar	1	
Broken car	1	
Misplaced switch	6	
Hand car	1	
Unfastened draw	1	
Derailing switch	1	
Cattle on track	7	
Landslide	3	
Washout	3	
Accidental obstruction	2	
Malicious obstruction	2	
Purposely misplaced switch	2	
Unexplained	23	
	—	75
OTHER ACCIDENTS:		
Boiler explosions	2	
Cylinder explosion	1	
Broken parallel-rod	1	
Miscellaneous	3	
	—	7
Total number of accidents		145

The causes of collisions where given were as follows:

	Rear.	Butting.	Crossing.	Total.
Trains breaking in two	6	..	..	6
Misplaced switch	..	5	..	5
Failure to give or observe signal	4	..	..	4
Mistake in giving or understanding orders	..	3	..	3
Miscellaneous	3	2	4	9
Unexplained	19	17	..	36
Total	32	27	4	63

A general classification shows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Defects of road	..	10	..	10	7
Defects of equipment	7	14	4	25	17
Negligence in operating	19	9	2	30	21
Unforeseen obstructions	1	19	1	21	15
Unexplained	36	23	..	58	40
Total	63	75	7	145	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
Passenger	28	26	3	57	28
Freight and other	93	50	4	147	72
Total	121	76	7	204	100

The casualties may be divided as follows:

	Collisions.	Derailments.	Other.	Total.	P. c.
KILLED:					
Employés	8	12	3	23	53
Passengers	2	2	..	4	9
Others	15	1	..	16	38
Total	25	15	3	43	100
INJURED:					
Employés	35	21	3	59	37
Passengers	22	24	4	50	32
Others	45	4	..	49	31
Total	102	49	7	158	100

Twenty-six accidents caused the death of one or more persons, and 30 caused injury but not death, leaving 89 (61 per cent. of the whole) which caused no personal injury worthy of record.

The comparison with May, 1887, shows:

	1888.	1887.
Rear collisions	32	18
Butting "	27	17
Crossing and other	4	..
Derailments	75	43
Other accidents	7	5
Total "	145	83
Employés killed	23	16
Others "	20	15
Employés injured	59	40
Others "	99	33
Pass. trains involved	57	30
Average per day:		
Accidents	4.68	2.68
Killed	1.40	1.00
Injured	5.09	2.35
Average per accident:		
Killed	0.296	0.373
Injured	1.089	0.879

The comparison with last month is not striking, and with this month of last year shows nothing but increases, which have now become common. Perhaps the most notable feature of the present report is the number of "other" persons killed and injured. These were not all tramps stealing rides, as is generally the case, but were innocent parties. Locust Gap and Fountain furnish most of them. At the latter place fair warning is said to have been given to all persons to retire to a safe distance some 20 minutes before the explosion, but at the former unsuspecting children perished in their beds at dead of night.

The derailment at South Norwalk, Conn., on the 18th, the collision near Jersey City on the 11th, and those at Fountain, Col., on the 14th, and Locust Gap, Pa., on the 6th, have been discussed in previous issues. One in Vermont, the 22d, is very clearly described in a report made by the Railroad Commissioners of that state. A wood train stood on the main track, and had a flagman posted 2,145 ft. off. A train of 40 cars of live stock weighing 1,275 tons, running at 25 or 30 miles an hour, and manned by only two brakemen, came along and, the grade being 38 ft. per mile decending, of course failed to stop. The rules prescribe 1,980 ft. as the minimum distance to send a flag. The Commissioners say the conductor should have sent the flagman further, and that the train was running too fast; but as to which party needs the larger share of the admonition, they do not say. The collision at Bordeaux, Wy., on the 30th, was caused by a form of negligence which ought to be readily guarded against by any conductor of experience; there certainly have been examples enough. A notable case was that in Illinois a year ago, where 10 men were killed. A conductor goes over road to which he has no right, on the basis of unofficial information to the effect that a washout or broken bridge constitutes a perfect barrier against all opposing trains; the event proves that it is not.

The newspaper account of the derailment near Jacksonville, Fla., the 21st, indicates that public opinion has some influence on railroads even where state commissioners do not exert great authority. It says: This trestle [where the train was derailed] has been an eyesore to the traveling public for some years past, and about two years ago the officers of the road were indicted by the Grand Jury for allowing it to get into such a dangerous condition. At the recent term of the Grand Jury the matter was again discussed, and a committee was sent out to make an examination, but before the jury completed its work the road had a large force of men put to work, and is now apparently putting the bridge in good condition.

The novel time-table by which the New York, New Haven & Hartford advertises itself proves to be even more of a new departure than was at first announced. The plan is to have all trains leaving New York, as far as possible, start on even hours. Trains heretofore have started at various times, as custom and tradition dictated; now, the old hours are left only where it is deemed absolute necessary to adhere to established custom. The following figures will give an idea of the appearance of the time-table:

Leave New York for New Haven, 5:01, 6:01, 7:01, **8:00, 9:00,** 9:01, **9:15, 10:00, 11:00** a. m.; **12:00,** 12:01, **1:00, 2:00, 3:00,** 3:02, **4:00, 4:02,** 4:03, **5:00, 6:00,** 7:01, 8:01, 9:30, **11:00, 11:30** p. m.

Leave New York for Mt. Vernon (the first local station) 5:01, 6:01, 7:01, 9:01, 10:02, 11:02 a.m.; 12:01, 1:02, 2:02, 3:02, 4:03, 4:30, 5:03, 5:30, 6:03, 6:30, 7:01, 8:02, 9:30, 10:30, 11:35 p.m.

Full-faced type indicates express trains. The 9:15 a. m. is the White Mountain express, running only in summer. The 4 p. m. makes its first stop at New Haven; 4:01 p. m. is express to Bridgeport; 4:02 p. m. makes principal stops to New Haven, and 4:03 p. m. is accommodation.

Running four trains within four minutes demands great care and watchfulness. Although there are four tracks for the first five miles and block signal stations very close together, the speed of all except the first of the four trains must be slackened, as but a short distance is traversed before the blocks become longer and the interval of time must be greater. With trains following each other so closely any detention to the forward one necessarily delays a number. For the first 12 miles the New York Central tracks are used, and it would appear that the New Haven has given the Central the lion's share of the time, the latter road having but one New Haven train to trouble it between 4:03 and 5:00. The crowded condition of the yard at the Grand Central station and the existence of a draw-bridge within six miles of it, increases the difficulties in this case. A very small detention or accident in the yard creates innumerable complications, and the first day's operation of the new table was characterized by serious delays to both outward and inward trains. In fact, these delays occur on excursion days or any occasion of unusual traffic.

The following clipping from the *Railway Review* gives another instance of the perplexities of growing city traffic:

"Passengers bound for St. Louis from the East are loud in their complaints of long delays in reaching the Union Station; the tunnel is entirely inadequate to meet the demands upon it; one train only is allowed in it at a time, and a long string of trains can be seen awaiting their turn to cross the bridge while the moving trains are still arriving."

A railroad man of our acquaintance recently suffered a delay of an hour from causes which it was perfectly plain had no right to exist on even a fairly managed road. It was not a New York or St. Louis road; but the road is one whose advertising matter contains some of the most seductive language to be found in the Imperial dictionary, and the incident emphasizes the fact that the art of satisfactorily handling a large volume of passenger traffic needs to be studied a good deal more than it is.

Who would have thought of charging a railroad corporation with attempting the *rôle* of a moral reformer? Yet the Northern Pacific has just been defeated in a legal contest in Washington Territory, where it was trying to do just what the Prohibition party would like to have accomplished, viz.: prevent the sale of spirituous liquors. The railroad filed a bill in the District Court of Kittelas County against the Board of Commissioners of the county and about fifty other persons, grocers, liquor dealers, saloon keepers, etc., asking an injunction to restrain the Commissioners from granting any licenses to the other defendants for the sale of liquor, and to restrain the latter from selling liquor to its employés. It alleged that it was a public corporation engaged in constructing its road through said county; that it employed during the year about eight thousand men in this work; but that the defendants by selling liquor to them made them drunk, prevented them from working and greatly damaged the plaintiff. But the Supreme Court, on appeal, has refused the injunction. If this action can be maintained, says the Court, then any ship coming in or leaving a port could maintain a bill against all the saloons, all the gambling houses and houses of ame in a city in which the ship landed. Every manufactory could maintain an action in like manner against all such houses in the city in which they were situate. Every railroad company could maintain an action against all such houses in towns where the trains stopped.

NEW PUBLICATIONS.

Manual of the Atchison, Topeka & Santa Fe Railroad and Auxiliary companies. One of the troubles of a director in modern gigantic railroad enterprises is the keeping track of the offices he has to fill. Reporters have poked fun at presidents who, when questioned on the witness stand, could tell their name and residence without difficulty but were unable to say what companies they were president of. Legal requirements have sometimes necessitated imposing the onerous duties of director on clerks and figure heads. Capitalists who have experienced these inconveniences will appreciate this little manual issued by Mr. E. Wilder, Secretary of the Atchison, Topeka & Santa Fe. The present issue is the 13th revision, and contains the title, date of incorporation, a brief description of road, date of annual meeting, names of directors and other officers, with other information of *sixty-six* corporations affiliated with the Atchison. Most of these are railroad companies, though there are some Union depot, land, and mining companies. There is a blank form on the first page in which the recipient of a copy of the book may fill in against each company the name of the office which he holds in that particular organization, and thus summarize his individual responsibilities. Apparently, Mr. Wilder generally fills up this form before sending it to those interested.

TECHNICAL.

Locomotive Building.

During the month of June the following 28 locomotives were built at the Schenectady Locomotive Works, Schenectady, N. Y.: for the New York Central & Hudson River, three 18x24 49-ton passenger, and four 20x26 63 ton consolidated freight locomotives; for the Chicago, St. Paul, Minneapolis & Omaha, six 17x24 6-wheel switching, six 18x22 passenger, and six 18x24 8-wheel freight locomotives; for the Indianapolis & St. Louis, two 18x24 47-ton passenger; and for the Meriden, Waterbury & Connecticut River one 17x, 24 8-wheel locomotive. The works are employing about 1,400 men.

The Canadian Pacific has just commenced building 30 locomotives at the Montreal shops, for use on the Rocky Mountain division of the road.

The Baldwin Locomotive Works have just completed one locomotive of an order for three from the Covington & Macon, and the others will be completed very soon.

Two locomotives are being built at the Terre Haute shops of the St. Louis, Vandalia & Terre Haute under the supervision of G. H. Prescott, Superintendent of Motive Power and Machinery.

The Lake Shore & Michigan Southern is fitting up several freight engines with the air brake, and purposes to introduce them extensively on through freight trains.

The Baldwin Locomotive Works will deliver to the Philadelphia & Reading this week six heavy locomotives, recently completed at the works.

Car Notes.

It is stated that a stock company has been formed to work a poultry car, the invention of H. Jenkins, of Frankfort, Ind., and that several of these cars are to be built at the Terre Haute Car Works at a cost of $1,000 each, complete.

The Elliot Car Works at Gadsden, Ala., have just completed 50 freight cars for the Alabama Great Southern. They are part of an order for 500.

James Harris & Co., of St. John, N. B., have been awarded the contract for building 150 box cars for the Canadian Pacific. They are to be completed by Aug. 1.

The Indianapolis Car & Manufacturing Co. has just commenced work on an order for 2,000 cars for the Atchison, Topeka & Santa Fe. It is expected that 20 a day will be built until the order has been filled.

Bridge Notes.

D. B. Sanford, of Milledgeville, Ga., asks for bids for erecting a bridge over Fish Creek at that place.

The contract for the iron work on the bridge to be built across the Kaw River at Argentine, Kan., has been let to the Rosedale Iron Co.

The contract has been awarded the Pittsburgh Bridge Co. for building a new bridge at Manor, Pa.

The Berlin Iron Bridge Co., of East Berlin, Conn., has been awarded the contract for building a three-span iron bridge at Vienna, N. Y. The company has also been awarded the contract for an iron bridge between Biddeford and Saco, Me., and also for one at West Warren, Mass.

The contract for the bridge of the San Antonio & Aransas Pass across the Colorado River near Austin, Texas, has been let to the King Iron Bridge Co., Cleveland, O.

The Wrought Iron Bridge Co., of Canton, O., has been awarded the contract for building an iron bridge at Deckertown, Pa.

The Lower Cover Foundry Works have just completed a bridge at Nappen, Cumberland Co., N. S., for the Intercolonial, and will soon commence the erection of another for the same road at Bathhurst.

The Queen Street Bridge Co. has been incorporated in Kansas to build a bridge in Topeka, Kan. The incorporators are C. K. Holliday, Samuel Bolman and others. It is stated that the superstructure of the bridge will be of steel, 45 ft. wide, and supported by nine stone piers.

The County Commissioners of Northampton County, Pa., ask for proposals, until July 12, for building a wrought iron bridge over the Lehigh River at Easton, Pa.

The County Commissioners will build a bridge over the Colorado River, near Austin, Texas.

Proposals are wanted, until July 10, for the construction of several bridges at Valentine, Neb. Address the County Clerk.

The Dominion Bridge Co., of Montreal, Can., has just completed the railroad bridge across the St. John River, at Fredericton, N. B., connecting the New Brunswick and Northern & Western roads. The bridge consists of nine spans, six being 242 ft. each, two 166 ft. each and one span 243 ft.

The Smith Bridge Co., of Toledo, O., has contracted for the new spans of the bridge at Gaysport, O., which are to replace those destroyed recently by the storm. The contract price is $9,995. The company has also the contract for a bridge across the Potomac River at Point of Rocks, Md., which is to be 1,400 ft. long and 16 ft. wide, and cost $45,000.

The Edge Moor Iron Co., of Wilmington, Del., has completed the bridge over the Cape Fear River, near Wilmington, N. C., which is erected for the Wilmington Railway Bridge Co.

An iron bridge is to be erected at Clifton Park, N. Y.

Proposals are wanted by the Auditor of Perry County, Ind., until Aug. 6 for the construction of an iron bridge at Cannelton.

The Rail Market.

Steel Rails.—A sale of 10,000 tons to a Southern road at private terms is reported and small lots from 500 to 2,000 tons are being placed at $30 at mill.

Old Rails.—There is very little demand, and the only sale reported is a lot of 1,000 tons of American, Jersey City, at $20.50.

Tire Fastenengs.—A sale to a Southern road of 6,000 kegs of spikes is reported. Quotations, 2@2.10c. for spikes, delivered, and 1.85@1.90c. for angle bars.

Long Rails.

The Northern of France is increasing the weight of its rails from 61 to 86 lbs. per yard, and the length from 26 ft. to 39 ft., which has been found to improve the stability of the line.

The Construction of the Tay Viaduct.

At the ordinary meeting of the Institution of Civil Engineers, on Tuesday, May 8, the President, Mr. Bruce, being in the chair, a paper was read on "The Construction of the Tay Viaduct, Dundee," by Mr. Wm. Ingliss, Assoc. M. Inst. C. E. Referring to the difficult character of the work, the author stated that the bridge across the Tay was probably the longest in the world over water, and for a considerable distance operations had to be conducted at a point in the river which was navigable for vessels of considerable tonnage. Seventy-three of the 85 piers in the structure were cylindrical, in groups of two for each pier. The shafts, as sunk into the river bed, were formed primarily of wrought-iron cylinders, built in annular sections. The first section was provided with a cutting edge, which sank into the river bed as the superincumbent weight was added. The cylinders were filled with concrete, which formed a compact shaft encircled by an iron tube. The sinking of the shafts was accomplished by means of platforms composed of five water tight tanks, two long lateral tanks being connected by three short ones, the intervening spaces being left open. Through the open spaces, or wells, the cylinders were sunk and filled with concrete, the distances being exactly measured, so that the centre of the well coincided with the centre of the shaft. Columns or legs were passed through apertures at the corners of the platform, their extremities resting on the river bed, and their shafts being fitted with pin holes, by which the height of the platform could be regulated. The apparatus on each platform was an engine and boiler for actuating the hydraulic and other pumps, workshops for the repair of tools, two 10-ton cranes, one 3-ton crane, a concrete mixer and a centrifugal pump. The stage was raised or lowered by hydraulic gear, consisting of a cylinder 12 in. in diameter, piston, piston rod, open cross-head and the necessary valves. When the platform was to be floated from one pier to another, it was lowered to catch the tide two hours before high water. Ropes were carried from one side of the stage to the piers of the old bridge, and three heavy anchors on the other. The steam crane was used as a winch, and when the platform had been brought to its new position the legs were lowered down and fixed. The foundation cylinders were riveted together on the shore, the various rings being lifted from cargo boats and placed in position by the 10-ton cranes. The first ring was formed of ⅝-in. wrought iron plates, 23 ft. in diameter and 13 ft. 4 in. deep; above this was the taper, 7 ft. deep, and then the upper portion, 18 ft. 6 in. in diameter. Each added ring was bolted through an internal flange to the preceding one, and these were lined with brickwork in the upper portion, and lowered to the bed of the river by hydraulic jacks. The excavation was accomplished for the most part by a steel digger of the Milroy pattern. This implement, however, was found ineffectual where silty sand had to be lifted, and another process was successfully attempted. Two flexible hose pipes, each 6 in. in diameter and 20 ft. in length, were placed in the bottom of the cylinder, the ends being brought together and joined into one 12 in. pipe leading to the pump on the platform. A diver was then sent down, who manipulated the suction pipes, so that whilst the one threw up sand the other kept the pump free by drawing clean water only. As much as 40 cubic yards had been pumped up in an hour, giving a subsidence of over 2 ft. in the cylinder. The cylinders having reached the proper depth, and the interior having been cleaned out to the cutting edge, the concrete was then put in. When the concrete was level with the flange carrying the brickwork, the diver packed it carefully underneath. The same process was followed in filling the twin pier.

The superstructure of the piers consisted of two hollow octagonal pillars connected by a semi-circular arch. Each pillar was temporarily erected at the works in Glasgow, partially riveted there, and the various parts marked for re-erection. The pillars were placed in position by using one of the movable platforms already described, from which all the apparatus had been removed, and a 5-ton steam derrick substituted. This was only necessary at the south side of the river, where the viaduct was highest, the gradient of the bridge at the north end permitting the use of boats with special derrick cranes instead of the platforms. The shallowness of the water on the sand-banks necessitated rapid working at the latter point, and the majority of this work at the north end was erected during portions of three tides, or a total of twelve working hours. The riveting was effected afterwards from a platform of light lattice girders, suspended on each side of the pier, which also served for use in painting the structure.

The lattice girder work of the old bridge formed part of the roadway of the new viaduct. The girders were removed from their old position by floating them upon two large iron pontoons, 80 ft. by 27 ft. 6 in. by 8 ft. deep, stiffened internally by lattice girders and water-tight bulkheads. These were bound together by girders, upon which lattice columns were erected, fitted with telescopic portions that could be adjusted to any required height. The pontoons were floated at low-water underneath the girders to be removed, and as the tide rose the telescopic girders were pushed up and securely pinned to the main column. At full tide the girders were free from the old bed-plates and clearly afloat, and by manipulating mooring ropes the pontoon was drifted to the side of the new bridge, a distance of 60 ft. On reaching its intended position, the hydraulic rams which had raised the girder from the old piers were opened, and the span was allowed to drop into its place in the new structure. The curve of the bridge at the north side of the river prevented this method from being adopted there, and the girders were transferred from the old to the new piers by means of traveling steam cranes. The new girders were built in the yards adjacent to the railway sidings on each side of the river, the riveting being done by hydraulic machinery. To bring the girders into position two travelers were constructed, by which each completed girder was transferred to the line of rails and carried to its position. The large spans were intended at first to have been erected from staging suspended between the piers, but it was ultimately decided to erect them on shore at the south side of the river, and to float them out to their positions. A timber jetty 400 ft. long by about 100 ft. wide was erected and provided with two docks capable of admitting pontoons, by which the girders might be floated. Temporary rails were laid, so that cranes might travel along the whole length of the girder while in process of erection. The bottom booms were first laid down and riveted; the struts, ties and parapets were next dealt with; then the top booms were placed and riveted, and afterwards the top cross-bracings and wind-ties. When the girder was completed the temporary flooring of the docks at each end of the jetty was lifted, and the pontoons were introduced. During the rising of the tide the pontoons were adjusted, and after the weight of the span, 514 tons, had been transferred to them, the girders were lashed round the pontoon stools. When free and afloat the pontoons were taken in tow by four steam tugs, and towed down the river for some distance so as to catch the flood-tide, which floated them to their positions between the piers. When placed at the spots which they were to occupy, the pontoons were partially sunk so as to be free of the girder, and were towed back to the dock to repeat the operation. The large spans, being now ready at the base of the pillars, had to be raised to the level of the viaduct.

Underneath each end-post inverted hydraulic rams were bolted to the flanges of the bottom booms, and cross-girders were placed across the framework, and were secured to the columns so that the rams might thrust from them. The hydraulic power was so regulated that it could be applied to the ends of the girder alternately. In this manner the span was lifted at one end 15 in. in two lifts, and the operation was repeated till the top of the pier was reached. The plates which had been removed from the superstructure of the piers to allow of the passage of the girder were fixed and riveted immediately after the span had been raised. The girders rested temporarily on the permanent cross-girders of the pier, thus enabling the lifting columns and bracings to be removed to another pier and erected for use. The bed-plates and rockers were inserted whilst the girders were thus temporarily raised about 6 in. above the finished level of the bridge. The flooring, which had been left incomplete until the spans were in position, was then finished and left ready for asphalting and laying for the permanent way.

Scarritt Car Chairs.

The improved Scarritt car chair, one of which was exhibited at the recent convention at the Thousand Islands, has just been applied to 4 cars on the Atchison, Topeka & Santa Fe, 6 on the Chicago, Rock Island & Pacific, 4 cars on the St. Louis & San Francisco and to 10 Pullman parlor cars. This very comfortable chair excited much attention at the Convention, and it is so carefully designed and well constructed that the number of orders already received is not surprising.

Cleveland, O., Central Viaduct Draw Span.

This is a heavy highway bridge lately erected for the city of Cleveland by the King Bridge Co. from the designs of Mr. W. M. Hughes. The span is 233 ft. over all. The trusses are 32 ft. deep at the centre and 20 ft. at the ends, spaced 30 ft. apart, and carry a 40-ft. roadway and two 8-ft. sidewalks. It is a deck bridge. The floor is 100 ft. above water line, and the bridge was erected in about 20 working days with a force of 15 men, without false works. The erecting is said to have cost about $2,000.

The Riley Elevated Railroad.

The Riley Railway Construction Co. has arranged for the erection of about one mile of elevated railroad, built according to its plan, to be erected at Point of Pines, near Boston. The work will be begun in about a fortnight and is expected to be finished by Oct. 1 This line is mainly experimental and for exhibition purposes. J. G. Brill & Co. are building three cars for it, and the Thomson-Houston Eectric Co. willfurnish the motors.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Belfast & Moosehead Lake, semi-annual, $3 per share on preferred stock and $1.37 per share on common stock.

Beech Creek, 2½ per cent. on preferred stock, payable July 16 to stockholders of record July 25.

Chicago, Rock Island & Pacific, quarterly, 1¼ per cent., payable Aug. 1 to stockholders of record June 28.

Delaware, Lackawanna & Western, 1¾ per cent., payable July 20, to stockholders of record June 30.

Evansville & Terre Haute, quarterly, 1¼ per cent., pay able July 17, to stockholders of record July 3.

Iron (Ohio), semi-annual, 2½ per cent., payable July 10.

Lake Shore & Michigan Southern, 2 per cent., payable Aug. 15 to stockholders of record July 13.

Long Island, quarterly, 1 per cent., payable Aug. 1 to stockholders of record July 2.

Michigan Central, 2 per cent., payable Aug. 15 to stockholders of record July 13.

Milwaukee, Lake Shore & Western, 3½ per cent. upon preferred stock, payable Aug. 15 to stockholders of record July 25.

Milwaukee & Lake Winnebago, 3 per cent., on the preferred stock, payable July 15, to stockholders of record June 30.

Nashville, Chattanooga & St. Louis, 1 per cent., payable July 10, to stockholders of record June 30.

New York Central & Hudson River, quarterly, payable July 16, to stockholders of record June 30.

Rome & Clinton, semi-annual, 3½ per cent., payable July 1.

Vermont Valley, 3 per cent., payable July 2.

Worcester, Nashua & Rochester, semi-annual, 3 per cent., payable July 3, to stockholders of record June 20.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Duluth, South Shore & Atlantic, annual meeting, Marquette, Mich., July 19.

Evansville & Terre Haute, special meeting, Evansville, Ind., July 21.

Marquette, Houghton & Ontonagon, annual meeting, Marquette, Mich., July 19.

North Carolina, annual meeting, Greensboro. N. C., July 12.

Toledo & Ohio Central, special meeting, Toledo, O., July 14.

Wilkesbarre & Scranton, special meeting, Philadelphia, Pa., July 2.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Society of Civil Engineers will hold its annual convention in Milwaukee, Wis., beginning June 28.

The *Ohio Institute of Mining Engineers* will hold its summer meeting at Logan, O., commencing July 11.

The Railroad Accounting Officers will meet at the Hotel Brunswick, New York City, July 25, to organize a permanent association.

The Association of Railway Telegraph Superintendents will hold its seventh annual meeting at the Murray Hill Hotel in New York city July 11.

The *National Association of General Passenger and Ticket Agents* will hold its fall meeting in Saratoga, N. Y., Sept. 18.

The *National Association of General Baggage Agents* will hold its next meeting in New York City July 18.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, on the third Thursday of each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street, N. Y.

The *Boston Society of Civil Engineers* holds its regular monthly meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday of each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *Engineers' Society of Western Pennsylvania* meets in Pittsburgh the third Tuesday of each month.

The *Roadmasters' Association of America* will hold its next convention at Washington, D. C., Sept. 11.

The *New England Roadmasters' Association* will hold its sixth annual convention at Boston, Mass., Aug. 15-16.

The *Western Railway Club* will hold its next meeting on the third Wednesday in September, at the Grand Pacific Hotel in Chicago.

Engineers' Club of Kansas City.

An adjourned meeting was held June 18. Measures were taken to ascertain by letter ballot and circular the sense of the club and of business and railroad men of Kansas City with regard to extending an invitation to the American Society of Civil Engineers to hold the next annual convention at Kansas City.

A letter was received from Mr. C. L. Strobel, on the part of the Western Society of Engineers, asking the following questions: 1. Do you favor the appointment of State engineers? 2. Do you consider it desirable for bridge engineers to adopt a scale of minimum rates for preparing working plans and specifications for bridges? 3. Are you willing to co operate with this society by the appointment of a committee to consider and report on the subject of a scale of minimum rates? It was voted to give answers to these questions by letter ballot of the club, and meantime to express a willingness to co operate in general in the matter, but to give no definite answer until reports from the Bridge Reform Committee and the Executive Committee are received.

The Secretary reported the receipt of subscriptions to the Kutter fund to the amount of $37.

Mr. John Donnelly read a paper on Street Pavements of Kansas City, which was discussed.

Boston Society of Civil Engineers.

A regular meeting was held June 20. A communication was read from the Engineers' Club of Kansas City, also from a committee of the Western Society of Engineers, on the subject of bridge inspection. These communications were referred to Messrs. John E. Cheney, David H. Andrews and Edward S. Shaw, as a special committee, to report at the September meeting. It was voted to omit the regular meetings for July and August.

Mr. Lucian R. Taylor read a paper entitled "A Brief Description of the Quincy Dam," and William S. Barber read a description of the dam of the Cambridge water-works on Stony Brook, which was illustrated by about forty stereopticon views showing the work in its several stages.

Mr. John R. Freeman described a washout which occurred on the canal at Nashua, N. H., and read a communication from Mr. Edwin F. Smith, Engineer of Canals, Schuylkill & Susquehanna Navigation Co., giving his experience in the construction of wooden dams. Mr. Wilbur F. Learned gave an account of some of the difficulties encountered in the construction of the Chestnut Hill and the Parker reservoir, and Mr. R. A. Hale described the Essex Co.'s dam at Lawrence, Mass.

Civil Engineers' Club of Cleveland.

A regular meeting was held June 12. It was decided that the semi-monthly meetings should be dispensed with and that special meetings should be called when necessary.

Mr. W. H. Searles exhibited some specimens of electric welding by the Thompson process, of which he gave a brief explanation.

Ohio Institute of Mining Engineers.

The summer meeting of the Ohio Institute of Mining Engineers will be held at Rempel's Opera House, Logan, O., beginning Wednesday, July 11. Those in attendance who have paid full fare can secure tickets in returning at one cent per mile over the Columbus, Hocking Valley & Toledo R. R., upon presentation of a certificate from the president of the Institute. No rates have been secured on other roads.

The following programme has been arranged: *Wednesday*, July 11, 7:30 P. M. Opening of the Session by the President, W. H. Jennings. Paper, School of Mines at Ohio State University, Prof. N. W. Lord. *Thursday*, July 12, meetings at 8:30 A. M., 1:30 and 7:30 P. M., with the following papers: History of Mining Legislation in Ohio, Hon. Andrew Roy; Shaft Mining in the Sunday Creek Valley, John J. Dun; Fire Clays of Five-mile Creek, Ellis Lovejoy; The Grading of Pig Iron, Edward Orton, Jr. Other papers have been promised. An interesting discussion on Brick Paving is expected. Business meeting during the day for the election of new members, etc. The evening will be devoted to a Stereopticon Exhibit of Mining Views by Prof. N. W. Lord. *Friday*—Excursion for members and invited guests to the Mining Regions, with dinner on train, at Brush Fork.

National Association of General Baggage Agents.

Notice is given that the next semi-annual meeting of the National Association of General Baggage Agents will be held in New York City, Wednesday, July 18th. The committee of arrangements have provided for the accommodation of members and their families at the Murray Hill Hotel, corner Park avenue and 41st street, during the convention. J. E. Quick, Detroit, is secretary.

The American Society of Civil Engineers.

The committee of engineers of Milwaukee having in charge the entertainment of the American Society of Civil Engineers during the convention, has arranged for a visit on July 3, to Appleton, where the water power paper mills and electric street railroad will be inspected. From Appleton the trip will be continued to Kaukauna, inspecting the water power there, the Milwaukee, Lake Shore & Western shops and the pulp mills. On Wednesday they will take a trip to Oconomowoc, and on the return will stop at the Soldiers Home, and view the display of fireworks.

PERSONAL.

—Walter Chamberlain, Acting Auditor of the Kanawha & Ohio, has resigned, taking effect July 1.

—Mr. Charles Macdonald, of the Union Bridge Co., has returned to New York City after a year's absence in New South Wales.

—Webster Snyder, Second Vice-President and General Manager of the Gulf, Colorado & Santa Fe, has tendered his resignati n, to take effect Aug. 1.

— Mr. Samuel Sloan, President of the Delaware, Lackawanna & Western, sailed for Europe in the Umbria June 23, and will probably not return till September.

—Miss Isabel Fisk, daughter of George C. Fisk, President of the Wason Manufacturing Co., was married, on June 20, to Mr. Oliver Hyde Dickinson, at her parents' residence in Brightwood (Springfield), Mass. It was the most brilliant of the many brilliant weddings in that city during recent years.

—Mr. B. P. Cheney, of Boston, a director in the Northern Pacific for about 20 years and one of the ex-presidents of the road, has retired on account of a pressure of other business and advancing age. He is succeeded by Mr. Charles T. Barney, of New York, who is the son of the late A. H. Barney, at one time President of the road.

—Thomas Ross, who, though 83 years old, has been in active service until within a few weeks, has just died at Susquehanna, Pa. Mr. Ross was a locomotive engineer on southern roads for about 30 years, and later was on the Susquehanna division of the Erie, but afterwards went west, remaining there for a few years. When he returned to Susquehanna, 20 years ago, he was given charge of a stationary engine at the Erie shops, where he has worked ever since.

— John Hornby, who succeeds O. B. Colton as General Superintendent of the Fort Worth & Rio Grande, is 50 years old, 22 of which have been spent in the railroad service. In 1876 he was appointed Master of Transportation of the Eastern Railroad of Massachusetts, and in 1879 was appointed Land Commissioner of the Marquette, Houghton & Ontonagon, retaining that position until appointed General Manager in 1884. He was also connected with the International & Great Northern and the Union Pacific.

—Mr. Charles E. Maxwell, a member of the firm of Manning & Squier, of 111 Liberty street, New York, died suddenly June 19, at his home in Orange, N. J., in the forty-third year of his age. The cause of death was a stroke of apoplexy. Mr. Maxwell was one of several sons of the late John Maxwell, founder of the banking-house of Maxwell & Graves, of Wall street. He was a brother of Eugene L. Maxwell, of Manning, Maxwell & Moore, 113 Liberty street, and of J. Rogers Maxwell and Henry W. Maxwell, of the firm of Maxwell & Graves, respectively Vice-President and Director of the Long Island Railroad Co.

ELECTIONS AND APPOINTMENTS.

Brantford, Waterloo & Lake Erie.—The following are the officers of this company: George H. Wilkes, President; Thos. Elliott, Vice-President, and J. J. Hawkins, Secretary, with headquarters at Brantford, Ont.

Brattleboro & Whitehall.—At the annual meeting held last week the following officers were elected: President, C. F. Thompson, Brattleboro, Vt.; Vice-President, E. L. Waterman; Secretary, J. L. Martin; Treasurer, George S. Dowley. The old Board of Directors were elected, with the addition of C. B. Williams, of Whitehall, and J. Q. Shumway, of Jamaica.

Camden, Gloucester & Mt. Ephraim.—At the annual meeting in Camden, N. J., the following directors were elected: Austin Corbin, George de B. Keim, S. A. Caldwell, A. A. McLeod, H. C. Felton, J. A. Bodine, Albert Foster, A. G. Richey, S. Garwood, C. H. Quarles, Howard Hancock, James E. Hayes, Howard T. Naisby.

Chicago, Burlington & Northern.—At the annual meeting held in Lacrosse, Wis., the following board of directors was elected: Alexander Cochrane, J. Murray Forbes, Francis L. Higginson, W. Powell Mason, Edward C. Perkins, A. E. Touzalin, and Charles L. Young.

Chicago Tunnel.—The following are the incorporators: Wesley R. Crumpton, Frank McMaster, L. H. Clark, T. M. Nelson, and T. Z. Cowles, of Chicago, Ill.; Geo. W. Waite, and George H. Waite, of Hyde Park, Ill.; George W. Wilson, of Hinsdale, Ill., and James A. Slanker, of Itaska, Ill.

Chicago, Dayton & Cincinnati.—The directors of this new Indiana company are: Cyrus E. Briant, Lambdin P. Milligan, Samuel F. Day, Hugh Dougherty, L. A. Williamson, L. T. Davenport and George G. Pride.

Chicago, Dayton & Cincinnati.—The directors elected the following officers: President, L. P. Milligan; Vice-President, L. C. Davenport; Treasurer, Hugh Dougherty; Secretary, Thomas Roche; Chief Engineer, George G. Pride.

Cincinnati, Hamilton & Dayton.—The Board of Directors has organized by the re-election of the following officers: President, Julius Dexter; Vice-President and General Manager, C. C. Waite; Secretary, F. H. Short.

Cincinnati, Hamilton & Indianapolis.—The following directors were elected at a meeting last week: Julius Dexter, C. C. Waite, Eugene Zimmerman, George Hafer, A. S. Winslow, R. D. Marshall, William Hooper, James E. Neal, John H. Ridenour.

Duluth & Iron Range.—W. H. Brimson has been appointed Superintendent, with office in Two Harbors, Minn.

Evansville, Fort Wayne & Chicago.—The incorporators of this new Indiana company are: A. M. Duke, Milton Shirk, R. A. Edwards, of Peru; T. J. Immel, C. B. Knowlton, of Logansport.

Evansville & Terre Haute.—S. T. Nelson and W. H. Payne have been elected directors to fill vacancies in the board.

Fort Worth & Rio Grande.—John Hornby has been appointed General Superintendent, vice O. B. Colton, resigned. In addition to his other duties he will have charge of the Traffic Department, acting as General Freight and Passenger Agent.

Georges Creek & Cumberland—Pennsylvania in Maryland.—The following were elected directors for each of the above roads at the annual meeting last week: Henry Loveridge, Sidney Wintringham, George L. Kingsland, G. P. Bangs, J. A. Alexander, A. M. White, and Benjamin Williamson. Henry Loveridge was chosen President, and J. A. Millholland General Manager.

Jacksonville, Tampa & Key West.—Alfred Bishop Mason has been chosen Vice-President, and will assume the duties of General Manager, vice G. W. Bentley, resigned.

La Crosse, Mineral Point & Highland.—The incorporators have elected the following officers: President, Calvin Spensely, of Mineral Point; Vice-President, B. L. Washburn, of Excelsior, Richland County; Secretary, Philip Allen, Jr., of Mineral Point; Treasurer, R. Kennedy, of Highland.

Los Angeles County.—W. T. Spillman, of Los Angeles, Cal., has been elected a director of the company.

Mexican National.—The new board of directors has organized with the following officers: W. G. Raoul, President; J. A. Horsey, Vice-President; Gabriel Morton, Treasurer; Andrew Anderson, Jr., Secretary, and George Bernard, Assistant Treasurer and Assistant Secretary.

Milwaukee, Lake Shore & Western.—The new board of directors has organized by re-electing the old officers, as follows: President, F. W. Rhinelander, of New York; Vice-President, Joseph R. Busk, of New York; Treasurer, Gordon Norrie, of New York; Secretary and General Solicitor, A. L. Cary, of Milwaukee; General Manager, H. F. Whitcomb, of Milwaukee.

Minneapolis, St. Paul & Sault Ste. Marie.—H. L. Shute has been appointed Traffic Manager, and the office of General Freight Agent has been abolished.

Missouri, Kansas & Texas.—W. P. Homan has been appointed General Manager.

Montpelier & White River.—L. F. Aldrich has been elected Vice-President to succeed E. E. French, deceased, and George T. Childs, Secretary and Treasurer.

Natchitoches.—E. W. Westfield has been appointed Superintendent and General Freight Agent, with office in Natchitoches, La., vice W. W. Logan resigned.

New York, Lake Erie & Western.—J. W. Tragellis has been appointed Master Mechanic of the Susquehanna Division, with office in Elmira, N. Y.

Ogdensburg & Lake Champlain.—At the annual meeting held in St. Albans, Vt., June 21, the following directors were elected: N. J. Averill, Ogdensburg; W. A. Haskell, J. A. Carlton, and H. S. Mills, of Boston; J. G. Smith and F. S. Stranahan, J. W. Hobart and E. C. Smith, St. Albans; B. B. Smalley, Burlington; J. R. Tandon, Montreal; D. W. Lawrence, Malone; S. A. Kellogg, Plattsburg, and J. H. Kimball, Bath.

Orange Belt.—Frank E. Bond has been appointed General Freight Agent, with office at Oakland, Fla.

Oregon & California.—The road has now passed under the actual control of the Southern Pacific and the general officers of that company have had their authority extended over it. The following appointments have also been made, with headquarters in Portland: Manager of Lines in Oregon, Richard Koehler; Assistant General Freight and Passenger Agent, lines in Oregon, E. P. Rogers. These gentlemen held similar positions under the old management.

Pennsylvania.—At a meeting of the directors in Philadelphia, June 27, Frank Thomson, Second Vice-President, was chosen First Vice-President, to succeed E. Smith, resigned. Mr. Thomson will still continue in charge of the transportation passenger and freight departments, though his duties will be enlarged. The following changes have also been made: J. N. Du Barry, Third Vice-President, to be Second Vice-President; John P. Green, Fourth Vice-President, to be Third Vice-President. These officers will still have charge of their present departments, but the accounting department will be placed in charge of Mr. Du Barry, and the treasury department in charge of Mr. Green. Samuel Rea has been made assistant to the Second Vice-President. The office of Fourth Vice-President was not filled.

Peoria, Decatur & Evansville.—James M. Warner has been appointed General Train Master, with office in Evansville, Ind.

Port Arthur, Duluth & Western.—The following are the officers of this company: President, Thomas Marks, of Port Arthur, Ont.; Secretary, W. H. Langworthy, Port Arthur; Chief Engineer, Henry K. Wickstead, Brantford, Ont.

Richmond & Chesapeake.—At the annual meeting held in Richmond, Va., the following officers were elected: C. E. Belvin, President; H. R. Boltzer, New York, Treasurer; R. E. O'Brien, New York, Chief Engineer; M. B. Portiaux, Secretary; N. S. Bailey, New York, Assistant Secretary. Directors were elected as follows: C. E. Belvin, H. R. Boltzer, Charles J. McKay, New York; George W. Dithridge, New York; E. C. Gordon, Dakota; Rufus Ingalls, New York. The same officers were also elected for the Fredericksburgh & Chesapeake.

Rome & Clinton.—The following directors were elected at the annual meeting in Rome, N. Y., June 20: B. J. Beach, A. Ethridge, W. H. Tuller, Henry Johnson, G. V. Selden, George B. Phelps, D. N. Crouse, J. I. Scollard, F. A. Elliott, I. R. Miller, C. H. Smyth, Ellery Stebbins, C. D. Hayes. The directors organized by electing the following officers: President, J. I. Scollard; Vice-President, B. J. Beach; Secretary and Treasurer, C. D. Hayes.

St. Cloud Sugar Belt.—Andrew Gay, Edward J. Etting and R. T. McCarther, Jr., of Philadelphia, are the incorporators of this new Florida road.

St. Joseph & Grand Island.—At the annual meeting held in Elwood, Kan., last week, directors were elected as follows: Sidney Dillon, James H. Benedict, E. C. Benedict, Elias Asiel, William Strauss, F. K. Pendleton, of New York; F. L. Ames, G. M. Lane, C. F. Adams, of Boston; John P. Usher, of Lawrence, Kan., H. P. Dillon and A. L. Williams, of Topeka, Kan., and W. Mink, who was elected in the place of T. J. Potter, deceased.

St. Paul & Duluth.—At the annual meeting in St. Paul last week the following directors were elected: R. S. Hayes, W. H. Fisher, James Smith, Jr., A. H. Stevens, R. B. Dobson, W. C. Tuckerman, E. W. Peet and C. S. Day. The directors elected officers as follows: President, R. C. Hayes; Vice-President and General Superintendent, W. H. Fisher; General Solicitor, James Smith, Jr., Secretary and Treasurer, P. S. Harris.

Seattle Land & Improvement Co.—The incorporators are as follows: G. W. Prescott and Thomas Ewing, of San Francisco, Cal., and John B. Hoyt, Leigh S. J. Hunt and H. G. Struve, of Seattle, Wash. T.

Union Pacific.—D. C. Bevard has been appointed Assistant Superintendent of the Kansas division and branches east of Brookville, vice W. Y. Carlton, resigned.

Union Pacific, Lincoln & Colorado.—The directors of this new Kansas company are: A. L. Williams, H. P. Dillon, G. W. Veale, R. W. Jenkins, Henry Strong, Jacob Smith, of Topeka; G. A. A. Dean, of Lincoln, Kan.

The incorporators of the company are: Joseph N. Choate, Scott Bryan, William Fuller, Harper Avahood and Amos H. Fowler, of Denver.

Williamsville, Greenville & Northern.—The incorporators of this Missouri company are: Hiram N. Halladay, Ambrose B. Martindale, Carrick W. White, Robert B. Gladden and John T. Butts.

OLD AND NEW ROADS.

New Companies Organized.—Brookfield.—Chicago, Dayton & Cincinnati.—Helena, Batesville & Aberdeen.—St. Cloud Sugar Belt.—Union Pacific, Lincoln & Colorado.—Williamsville, Greenville & Northern.

Anaheim, Alinda & Pomona.—It is stated that grading will be commenced about July 1 on that part of the road from Anaheim, Cal., to Alamitos Harbor, on the Pacific Ocean. Work is also to be pushed between Carlton and Pomona.

Anglesea.—The road will hereafter be operated as part of the West Jersey railroad system.

Baltimore & Ohio.—Tracklaying has been finished on the short branch from Carroll, Md., to Clifford, to connect the Annapolis & Baltimore Short Line with the main line of the Baltimore & Ohio. A survey has been made for a branch to extend from Savage, Howard County, Md., north 2½ miles to Guilford in the same county.

Bishopville.—The extension from Crosswells to Scarbrough, S. C., a distance of six miles, has been completed and is being extended one mile to Yoseys.

Brockenridge.—A survey has been made for an extension south from the present terminus at Victoria, to Fordsville, Ohio County, O., a distance of 14 miles. G. Macfarlane, Louisville, is General Manager.

Brockville, Westport & Sault Ste. Marie.—The contract has been let for the construction of the branch to Newboro, Ont., and work has been commenced.

Brookfield.—Incorporated in New York, to construct a road from North Brookfield to Brookfield, an estimated distance of six miles.

Burlington & Missouri River.—Tracklaying on the Beaver Valley road has now been completed from Blakeman to Saint Francis, Kan., a distance of 39 miles. The work is being done by the company's forces under charge of J. S. Peter, Resident Engineer.

Canadian Pacific.—Tracklaying on the extension through Maine has been completed to Greenville, at the lower end of Moosehead Lake, about 60 miles west of Mattawamkeag, on the Maine Central.

Cape Fear & Yadkin Valley.—The completion of the Mt. Airy extension was celebrated by a large excursion of residents of Raleigh and other points in North Carolina to Mt. Airy. This extension has been built from Pilot Mountain to Mt. Airy, N. C., a distance of 15 miles. On the branch extending from Madison to Stokesdale, N. C., 11 miles have been graded. Grading is also in progress on the first 30 miles of the extension from Fayetteville to Wilmington N. C., for which W. P. Fortune, Asheville, N. C., is the contractor

Chattanooga, Rome & Columbus.—Tracklaying between Chattanooga, Tenn., and Carrollton, Ga., was completed this week at a point near Carrollton. It is stated that the erection of the company's shops in Chattanooga will be commenced at once.

Chattaroi.—The survey has been completed from the Big Sandy River at Louisa, southwest 33 miles to Paintsville, Ky.

Chicago, Dayton & Cincinnati.—Incorporated in Indiana to build a road from the northeast corner of Madison township, Jay county, northwesterly through the counties of Adams, Wells and Huntington to Huntington. The capital stock is $50,000.

Chicago Tunnel.—The company has filed articles of incorporation in Illinois to build a road in Chicago, entirely or partly underground. The capital stock is $27,000,000.

Chino Valley.—Articles of incorporation providing for an extension from the present terminus at Chino to some point on the Pacific Coast, have been filed in California. Richard Gird, of Chino, holds $198,000 of the $200,000 authorized capital.

Chippewa River & Menomonie.—About 300 men are reported to be at work on the extension from Big Bend to Bruce, about 10 miles, and it is expected that it will be ready for operation by September.

Chowan & Southern.—The Councils of Norfolk, Va., last week voted to lease to this company valuable wharf privileges in that city for 30 years from July, 1889, at a nominal figure, and gave the company the right to purchase, during the term or at the expiration of the lease, for $100,000. The company has also procured options of adjoining properties, which gives it 400 ft. water front. It is conditioned, however, that the company make a traffic contract or a consolidation with the Atlantic Coast Line and the Richmond & Danville, or the West Point Terminal Co., the object being to make Norfolk the deep water terminus of these systems. The company has also secured options on valuable water front at Portsmouth.

The charter of the company provides for a road from Raleigh, N. C., to Norfolk, Va., by way of Rocky Mount and Tarborough, N. C. It is stated that the Richmond & Danville will build that part of it from Raleigh, N. C., northeast about 50 miles to Rocky Mount, where it will connect with the Atlantic Coast Line, the latter road continuing it from Tarborough on to Norfolk.

Cincinnati, Hamilton & Dayton.—About two miles of track has been laid on the extension from McComb to Findlay. Tracklaying is progressing from both Findlay and McComb, and it is expected to have the entire line, eight miles in length, completed by July 4.

Cincinnati, Wabash & Michigan.—Grading on the extension from Anderson to Rushville, Ind., which was begun several months ago, is suspended.

Colorado Midland.—The extension from the present terminus at Glenwood Springs to New Castle, Colo., is being completed very rapidly. Corey Bros., Ogden, Utah, are the contractors.

Columbus & Western.—The silver spike connecting Columbus, Ga., and Birmingham, Ala., was driven, at 9:30 p.m., June 19, by Resident Engineer J. A. Baker. The road from Columbus to Birmingham is 158 miles long, that part of it from Goodwater to Birmingham, 69 miles, having just been completed. It is expected that trains will be put on early in July. A through route from Kansas City to the Atlantic seaboard, via Birmingham, will be established.

Cresson & Clearfield County.—The survey has been completed for a branch from Dean, Penn., to mines on Laurel River, a distance of about three miles. G. Kaufman, Cresson, Pa., is superintendent.

Current River.—The road was completed to Grandin, Mo., last week. It is controlled by the Kansas City, Springfield & Memphis and extends from Willow Springs, on the

main line, easterly through Chicopee to Lee or Grandin, about 76 miles.

Delaware & Hudson Canal Co.—The double track on the Susquehanna Division being constructed from Schenevus to Sidney, N. Y., 15 miles, has been completed for about five miles to Maryland.

Detroit, Lansing & Northern.—Tracklaying on the extension from Grand Ledge to Grand Rapids, Mich., has been completed to Grand Rapids. The extension is being built under the name of the Grand Rapids, Lansing & Detroit. A branch two and a half miles long has also just been completed from Oakdale Park, near Grand Rapids, to Reeds Lake, O., but it is stated that on account of a change of the terminus at the lake injunctions will be served to prevent the operating of the road.

Duluth, Rainy Lake & Southwestern.—The contracts for building part of the road are to be let very soon, and estimates are now being made. The road has been surveyed from the mouth of Rainy Lake River at the International Boundary to a point on the Red River of the North. Some preliminary surveying has also been made between Duluth and the Lake of the Woods.

Elnora & Richmond.—Organized in Indiana to build a road from Elnora, Daviess County, on the Evansville & Terre Haute, northeasterly to Richmond, near the Ohio state line. It is stated that the survey for the line has been made, and that nearly all the right of way has been obtained. D. C. Griffiths, of Indianapolis, and others are interested in the enterprise.

Eutawville.—Tracklaying on the extension from Vances toward Sumter, S. C., about 32 miles, has been completed to the Santee River and is being rapidly completed to Brocton.

Evansville, Fort Wayne & Chicago.—Incorporated in Indiana to build a road from a point in Vanderburgh County, in the southwest part of the state, thence northeasterly across the state to a point in Allen County.

Fairbanks & Bisble.—The contract for constructing this Arizona road, 40 miles in length, has been let to H. P. Seldon, of Kansas City, Mo. The line will be controlled by the Queen Copper Mining Co., and will be principally used for transporting ore.

Galveston Air Line.—The locating survey is reported as complete from a point near Houston to Kerens, Tex., on the St. Louis, Arkansas & Texas, and is being continued northerly toward Paris. The distance by this line from Houston to Kerens (which is some 10 miles east of Corsicana) is about 175 miles. It is stated that nearly all the right of way between the two points is obtained.

Georgia Southern & Florida.—Tracklaying has been resumed and has reached a point about 50 miles from Macon, Ga., and is progressing at the rate of about a mile a day toward Valdosta, 150 miles from Macon, and to which, as already announced, the grading has been completed, with the exception of a 10-mile gap.

Helena, Batesville & Aberdeen.—Incorporated in Mississippi to construct a road from Aberdeen, Miss., northwest to Helena, Ark.

Houston, Central Arkansas & Texas.—It is stated that grading is to begin immediately on that part of the road between Monroe and Bastrop, La. W. A. Bright, Monroe, La., is Chief Engineer.

International & Great Northern.—In the suit of the state against this company for a forfeiture of its charter on the allegation that the company had not complied with the provisions of the charter in maintaining its road in proper condition, Judge Townes, of the District Court at Austin, Texas, has rendered a decision, holding, first, that notwithstanding the fact that portions of the respondent's road have not been kept in good repair, yet, taken as a whole, it has not so far failed in its duty of maintenance as to require the forfeiture of its corporate existence; second, that there has been such failure of compliance on the part of the respondent as to deprive it of the right to longer exemption from taxation, which was granted it for 25 years, dating from 1876.

Kansas City, El Paso & Mexican.—Surveys are being made for this road, which it is proposed to build from El Paso, Tex., to White Oaks, New Mexico.

La Crosse, Mineral Point & Highland.—It is stated that the preliminary survey for this road will be commenced soon, and completed by the end of July. The road is projected to extend from La Crosse southeasterly to Mineral Point in Lafayette County, Wis., on the Chicago, Milwaukee & St. Paul. It is intended to cross the Wisconsin River at Blue River in Iowa County.

Lehigh Coal & Navigation Co.—The locating survey has been completed for the extension from Phillipsburgh to a connection with the Lehigh & Hudson River, at Belvidere, N. J., a distance of 12½ miles.

Lime Rock.—It is expected that tracklaying on this road will begin early next week. The road is to be built from Lime Rock Quarries, near Rockland, Me., to the water front in that city, and will be about five miles long. P. Spofford and James Mitchell are the contractors.

Louisville & Nashville.—The contract for building the extension of the Cumberland Valley Branch from Pineville, Ky., to Cumberland Gap Tunnel, 14 miles, was let June 20 to Serpell & Morris, Louisville, Ky., work to be completed April 1, 1889. There will be some very heavy work required.

Louisville Southern.—The locating survey for the branch from Lawrenceburg to Lexington, Ky., has been almost completed, and grading will begin immediately.

Lynchburg & Durham.—The grading on the first 10 miles of the road south from Rostburg, Va., toward Durham, N. C., has been completed and tracklaying on this section has been commenced.

Manitoba Central.—Tracklaying was commenced June 21 at West Lynne, Manitoba, near the International Boundary, and work will be pushed as rapidly as possible to Winnipeg.

Mashall, Paris & Northwestern.—The grading on about 15 miles of the extension from Montvale Springs to Gilmer, Tex., is now completed, and about seven miles have also recently been completed south from Paris, Tex., making a total of 30 miles of road graded from Paris toward Gilmer, on the St. Louis & San Francisco.

About 30 miles of grading south from Paris, Texas, toward Marshall, has been completed, and work is also progressing from a point beyond Marshall toward Paris.

Mexican Central.—Grading is being rapidly completed between Aguascalientes and Salinas, 62 miles, and surveys for an extension from Salinas to San Luis Potosi, 64 miles, are being made.

Minneapolis, St. Paul & Sault Ste. Marie.—The company has filed for record in Minnesota a copy of a consolidated first-mortgage in favor of the Central Trust Co. of New York for $21,000,000. The mortgage is on all the property of the four lines included in the consolidated company. The mortgage provides that when the mileage of the system exceeds 800 miles all above that shall be bonded for $20,000 per mile by the company free of any claim as regards this mortgage.

Mississippi River & Bonne Terre.—About three miles of track has been laid on this road northwesterly from Borne Terre toward Crystal City, Mo., on the Mississippi River.

Missouri, Kansas & Texas.—In addition to the main suit filed in Kansas for the appointment of a Receiver, the Mercantile Trust Co., of New York, has filed suits in the Northern and Eastern Districts of the Federal Court in Texas, praying for the appointment of a Receiver. The complaint recites that the company has defaulted in the payment of $771,645 interest, due June 1, on the general consolidated mortgage bonds, which amount to $45,000,000, and are dated Dec. 1, 1880, and cover all the lines of the company. Default has also been made on the Tebo & Neosho first mortgage bonds, which amount to $2,000,000 and cover 102 miles of the road, and as there is danger of the system becoming dismembered and sold on account of floating indebtedness, a receiver is prayed for. The application will not be argued until September.

Missouri Pacific.—Tracklaying on the Jefferson City, Boonville & Lexington road has been finished between Boonville and Marshall, Mo. This completes the road from Lexington to Boonville.

Mobile & Birmingham.—Poor & Greenough and Edward Sweet & Co., of New York, offer at 92½ and interest the first mortgage 50-year gold bonds of the company, the principal and interest of which are guaranteed by the East Tennessee, Virginia & Georgia. The bond is a first mortgage at the rate of $20,000 per mile on the line, which extends from Selma Junction to Mobile, Ala., 150 miles. East Tennessee, Virginia & Georgia consols will be accepted at market rates in exchange for these bonds.

Montana, Kansas & Texas.—A preliminary survey has been made from Albany, Tex., southerly through Baird to Coleman, about 55 miles. It is to be continued from Coleman through Brady and Mason to Kenville, on the San Antonio & Aransas Pass. Stanley M. Jones is Chief Engineer.

Nashville, Chattanooga & St. Louis.—It is said that an extension from Tullahoma to Lynchburg, Tenn., is under consideration by the officers.

Nashville & Knoxville.—Tracklaying has now been completed from Lebanon, easterly to beyond Gordonsville, and is expected to reach Carthage, north of the latter place, by July 4.

New York, Mahoning & Western.—The North Chicago Rolling Mill Co. has commenced a suit in equity in Ohio against the company, asserting that the road is insolvent, and asking that a receiver be appointed. A replevin suit has also been instituted by the Rolling Mill Co. against the road, it being claimed that $85,000 is due them for material furnished the road. About 2,320 tons of steel rails and 485,000 lbs. of angle bars were seized at Ottawa.

Oxford & Clarksville.—Tracklaying is in progress from both Oxford and Durham, N. C., and it is expected to have the road completed about July 20.

Pennsylvania.—It is stated that H. H. Houston, of Philadelphia, a director in this company, is buying right of way for a road to be built from Bryn Mawr to Chestnut Hill and Holmesburg, Pa., connecting at the latter point with the New York Division. It is also stated surveying has been begun, and that the road is to be built by an independent company, but operated by the Pennsylvania.

Philadelphia & Reading.—The property owners along the Philadelphia & Chester Branch Railroad have commenced mandamus proceedings against this company to compel it to run passenger trains over the road. In 1873, when the Philadelphia, Wilmington & Baltimore relocated part of its line, the Philadelphia & Chester Branch was bought in the interest of the Philadelphia & Reading for $350,000, it being conditioned that no passenger trains were to be run over the tracks. The defense will be that by the violation of this clause the lease will be vitiated.

Pittsburgh, Shenango & Lake Erie.—A 50-year five per cent. first-mortgage bond, amounting to $2,500,000, has been filed in Pennsylvania in favor of the Central Trust Co., of New York. The mortgage is to provide funds for the extension to Lake Erie.

Portland & Vancouver.—Grading has been commenced on this short Oregon road, which is to extend from Portland, northerly through Albina, and connecting by ferry with Vancouver, Washington Ter. The grading and bridges are to be completed by Aug. 10, and it is expected to have the road open for traffic early in September.

Richmond & Chesapeake.—The contract for constructing the road from Richmond, Va., to Wicomico, in Westmoreland County, including the tunnel at Richmond, has been let to the Richmond Tunnel & Construction Co., of which E. W. Scott, of New York, is President.

Roanoke & Southern.—The contract for building the road between Martinsville, Va., and Winston, N. C., has been closed with the Virginia & North Carolina Construction Co., and the company ask for bids for constructing the first division from Winston, in sections of from 5 to 60 miles. T. H. Fries, Salem, N. C., is President of the Construction Company.

The Roanoke & Southern Construction Co. has been formed to build this road, and the contract will be let in a few days.

Rockaway Valley.—Track laying has been commenced on this short New Jersey road, and it is expected will be completed about July 10. It is to connect New Germantown with the Central of New Jersey at the White House, N. J.

St. Cloud Sugar Belt.—Articles of incorporation have been filed in Florida to construct a road from Kissimmee, Osceola County, easterly to St. Cloud and Runnymede, about 12 miles. The Osceola Construction Company has been organized to build the road, and has sublet the contract to Douglas & Towne.

St. Ignace, Sault Ste. Marie & Northern.—The survey, which was stopped during the winter, has been resumed, and will be completed as soon as possible. The road is to extend from St. Ignace to Sault Ste. Marie, Mich.

St. Louis, Arkansas & Texas.—It is stated that contracts have been let for constructing a line from Malden to Delta, Mo., about 60 miles, and that the remaining 27 miles to Grand Tower, Ill., where the road is to cross the Mississippi, reaching St. Louis from the Illinois side, will also soon be let.

St. Paul, Minneapolis & Manitoba.—Tracklaying is in progress on the Duluth, Wilmar & Sioux Falls road, and the piers for the bridge at Granite Falls, Minn., are being erected. Track is also being laid on the Eastern Minnesota, which is to extend from Hinckley to Lake Superior.

Seattle, Lake Shore & Eastern.—Eighteen car loads of steel rails were shipped to Seattle last week from the Colorado Coal & Iron Co.'s works at South Pueblo, Col. These are said to be the first steel rails ever shipped to the Pacific Coast from works west of the Missouri River.

Seattle Land & Improvement Co.—The company has been incorporated in Washington Territory, to build railroads, telegraph lines, operate steamship lines, etc. The capital stock is $1,500,000.

Sinnemahoning Valley.—The contract for constructing about 25 miles of extensions of the Pennsylvania road has been let to W. E. Trench, of Buffalo, N. Y.

Sioux City & Northern.—Surveyors are still at work on this line between Slaytor and Luverne, Minn.

South Norfolk.—It is expected that grading on this Canadian road, which is to extend from Port Rowan to Simcoe, Ont., 17 miles, will begin early in July.

Southern Pacific.—The grading on the extension of the Goshen division from Huron, in Fresno County, westward toward the Coast Range of mountains, has now been completed for about 20 miles. The San Pablo & Tulare division has now been graded south from Tracy for about 140 miles, to a point near the southern boundary of Fresno County. Thirty-seven miles of this division south from Tracy to Newman will be put in operation July 1. About 71 miles of the Stockton & Tulare, running southeasterly from Fresno to Plano, in the southern part of Tulare County, will also be opened for traffic on that date. Regular trains will also begin running on that date on the Willows & Mendocina, which has now been completed westerly from Willows about 17 miles to a point named Fruto.

Texas & Pacific.—A branch is being surveyed from Plaquemine, La., about 9 miles, to reach deep water, where connection is to be made with a steamer line.

Tilton & Belmont.—Grading on this short New Hampshire road will probably be commenced in July. The survey has been completed, and the location papers will soon be filed. E. C. Bears, Belmont, N. H., is Secretary.

Toledo, St. Louis & Kansas City.—The changing of the gauge of the tracks was completed last week from Frankfort, Ind., to Eugene Junction, Ind., near the Illinois state line, 61 miles. This leaves 184 miles to change to make the entire road from Toledo, O., to East St. Louis, Ill., 451 miles, standard gauge.

Columbus Southern.—A force of 100 men and 100 teams were this week added to the forces grading the road, by the Chattahoochie Brick Co., and it is stated that this force will be increased next week. The road is being constructed from Columbus southeast through Dawson to Albany, Ga., about 80 miles.

Union Pacific, Lincoln & Colorado.—This company has filed articles of incorporation in Colorado and Kansas. The Colorado corporation projects a road from the Kansas state line in Elbert or Arapahoe County west to Denver, with branches southwest to Colorado Springs, Canon City, and also to the southern part of the state. The capital stock is $7,500,000. The Kansas corporation proposes to build seven lines of road, with an aggregate mileage of 1,320 miles, and has a capital stock placed at $20,000,000. The first line is to be from Saline west to state line, 260 miles; second, Oakley northwest to Cheyenne County, 100 miles; third, from Clay City west to Graham County, 140 miles; fourth, from Belleville west to Sherman or Cheyenne counties, 250 miles; fifth, from north line of state in Phillips or Norton counties southwest, intersecting line four in Sherman County, 120 miles; sixth, from Ellsworth west to state line in Wallace or Greeley counties, 200 miles; seventh, from a point on line six southwest to state line in Morton County, 250 miles.

Incorporated in Colorado by officers of the Union Pacific for the purpose of building a road from the Kansas state line to Denver with branches to Colorado Springs, Canon City and the southern part of the state.

Uniontown, Newberne & Dayton.—A survey is being made for this road, which it is proposed to build from Newberne, Ala., southerly to Uniontown and thence southwest to a point on the Tombigbee River near the mouth of Beaver Creek, an estimated distance of 40 miles. Another route is proposed from Uniontown west through Linden to the Tombigbee, about 27 miles long, and it is stated that a survey for this line will soon be made.

Upper Coos.—The formal opening of the road was celebrated this week at Colebrook, N. H. The line was completed last year from North Stratford, N. H., on the Grand Trunk, thence north through Colebrook to West Stewartstown, about 23 miles. A short extension is now being built to the Canadian border at Hereford, Que. From this point the road is being built under the name of the Hereford railroad, north through Cookshire to a connection with the Quebec Central, a distance of about 50 miles.

Utica, Adirondack & Saratoga.—Two surveys of this line have been completed, but the surveyors are still in the field, and will run three more lines. The road is projected from Prospect, Herkimer County, N. Y., to Noblesboro. R. W. Sherman, Utica, is chief engineer.

Vaca Valley & Clear Lake.—An extension 18 miles in length has been completed from the terminus at Madison, Yolo County, Cal., up the Capay Valley to Rumseys, Cal., and will be placed in operation July 1. It is stated to be the intention to ultimately continue the extension north to Lower Lake.

West Jersey.—The company has purchased the Anglesea road, and will hereafter operate it as part of their system. The road extends from Holly Beach to Anglesea, N. J., a distance of seven miles.

Williamsville, Greenville & Northeastern.—Articles of incorporation have been filed in Missouri by a company of this name, to build a road from Williamsville to Greenville, in Wayne County. The capital stock is $120,000.

TRAFFIC AND EARNINGS.

The Inter-state Commerce Commission.

A decision has just been rendered in the case of the Omaha Board of Trade against the Union Pacific and other roads. The complaint, filed Nov. 16, 1887, alleged discrimination in freight rates from Chicago, which were considerably lower in proportion to points west of Omaha, like Grand Island and Hastings, than the rates from Chicago to Omaha and from Omaha to Grand Island combined.

The opinion by Chairman Cooley goes very fully into the facts and bearings of the case, quotations from tariffs being shown to substantiate statements made. The case was virtually a demand that Omaha be placed on an equality

with Chicago, and that certain "jobbing centres" west of Omaha be placed on an equality with Omaha, but that Omaha be allowed to say what towns shall, and what shall not, be termed jobbing centres. It was almost precisely the same as the Richmond & Danville case decided sometime ago (1 Int. St. C. C. Rep., 401), but Chairman Cooley says: "Nevertheless, * * we are not only willing but desirous to overrule the former decision if satisfied that we have committed any error in making it."

Not only Omaha and Chicago, but all the towns west of Omaha named in the tariffs complained of, are vitally interested and must be considered. * * It is impossible that there should be any agreement as to what towns are trade centres. Omaha concedes that Fremont should be favored; but why not Beatrice as well? Even if trade centres ought to be favored, the law does not authorize the Commission to do it. Omaha asks to have "every town in Nebraska placed on a perfect plane of equality," and yet absurdly excepts itself from the list.

The full report, though consisting of arguments which are trite with railroad men, will be a good document for them to have on file. It is summed up as follows:

First. The objection taken in one of the answers to the institution of proceedings by the Freight Bureau of the Omaha Board of Trade is not sustained. The case of the Vermont State Grange vs. the Boston & Lowell Railroad Co. (1 Int. St. C. C. Rep., 158) is sufficient authority for this ruling.

Second. We find the facts constituting the alleged ground of grievances to be as set forth in the complaint and amended complaint, respectively.

Third. Those facts do not make out a case of unlawful discrimination by the defendant carriers as against the city of Omaha or show that that city is subjected to undue or unreasonable prejudice within the meaning of the third section of the act to regulate commerce.

Fourth. The complaint must therefore be held not sustained.

The Commission has announced that it will hear at Dubuque, Ia., on July 25, any parties wishing to testify in the matter of through rates between Chicago and St. Paul, which have been made, by the Chicago, St. Paul & Kansas City and other roads, lower than local rates to intermediate points.

Traffic Notes.

The Iowa Commissioners have, at the request of the roads postponed the date for putting in effect the new freight tariff to July 5. It is possible that the roads will appeal to the courts.

The Sault Ste. Marie line, which takes freight from New, York to St. Paul over the New York, Ontario & Western, Rome, Watertown & Ogdensburg and Canadian Pacific roads, announced on Tuesday of this week that its rates would be on the basis of 60 cents, first-class, from the Atlantic seaboard to St. Paul. Some accounts say this applies only from Boston. The rate from St. Paul to Portland, Or., and San Francisco being only $2.80, this action will make a through rate from the Atlantic to the Pacific coast of only $3.40, while the regular rate is $4.

Round trip passenger rates between St. Louis and St. Paul have been reduced to $20, a reduction of $4. This was necessitated by low rates made between St. Paul and Chicago on the occasion of the Republican convenion.

The rate on dressed beef from Chicago to New York was reduced on June 25 from 65 to 46½ cents per 100 lbs., and on Tuesday was further reduced to 40 cents by the Lake Shore and the Michigan Central. The 46½ cent rate applied to both Boston and New York, but the last cut is made to New York only. Later reports say the 40 cent rate is general and that the Pennsylvania takes provisions from Chicago to the seaboard at 25 cents.

Lake rates have been slighty reduced, the quotations for a week or more having been on a basis of 1¾ cents per bushel on wheat from Chicago to Buffalo. The rate on coal by lake from Buffalo to Chicago has advanced from 90 cents to $1 per ton.

The cutting of rates on pig iron from Birmingham and other Southern points to the Ohio River, and north of there, has been stopped or, at least, suspended. It is stated that it has been agreed to make the rate to Louisville 25 cents per ton less than the rate to Cincinnati. A Birmingham paper states that pig iron is being shipped from that region to Eastern points, through Pittsburgh, and sold at lower prices than Pittsburgh iron.

Fifty car loads of watermelons passed north through Birmingham, Ala., from Florida on Wednesday of last week.

Reports from Winnipeg state that Manitoba millers find themselves unable to deliver flour in Montreal at prices asked for Minneapolis flour. It is claimed that the St. Paul, Minneapolis & Sault Ste. Marie, in connection with the Canadian Pacific, makes this Minneapolis competition possible by large reductions in rates.

Transcontinental Rates.

Members of the Transcontinental Association have held a long conference at St. Paul. Action was taken which will lead to the application of one classification to all Pacific coast traffic, in accordance with the recommendation of the Inter-state Commerce Commission in the recent Denver case. All emigrant rates from the Missouri River to California are to be withdrawn July 1, and there will be only two classes—first and second—the through rates being $60 and $35, respectively.

Coal.

The coal tonnages for the week ending June 23 are reported as follows:

	1888.	1887.	Inc. or Dec.	P. c.
Anthracite	677,492	702,264	D. 24,772	33.3
Bituminous	336,446	276,213	I. 60,233	21.7

The Cumberland coal trade for the week ending June 33 amounted to 64,447 tons, and for the year to that date 1,650,813 tons.

The coal and coke tonnage of the Pennsylvania originating on lines east of Pittsburgh and Erie for the week ending June 16, and the year to that date was as follows:

	Coal.	Coke.	Total.
Total for week ending June 16	246,527	66,965	313,492
Total for year 1888 to date	5,377,578	1,795,750	7,173,328
Total for year 1887 to date	4,832,444	1,587,815	6,421,259

On the Belvidere Division of the United Railroads of New Jersey the anthracite coal tonnage for the same periods was as follows:

	1888.	1887.	Dec.
Total for week ending June 16	27,796	32,363	4,567
Total for year to June 16	708,893	816,066	107,173

Cotton.

The cotton movement for the week ending June 15 is reported as follows, in bales:

Interior markets:	1888.	1887.	Increase.	P. c.
Receipts	7,278	4,952	2,326	50.0
Shipments	25,276	5,793	19,483	389.0
Stock	65,081	45,252	19,829	42.2
Seaports:				
Receipts	13,228	2,364	10 864	500.0
Exports	37,090	10,072	27,018	270.0
Stock	313,016	292,385	20,631	6.8

Railroad Earnings.

The statement of the earnings and expenses of the Baltimore & Ohio for the month of May and the 8 months is given below:

Gross earnings	$1,243 922
Net earnings	471,566
Increase in net	11,131

For the first eight months of the fiscal year:

Gross earnings	$13,204,244
Expenses	9,677,639
Net earnings	3,526,605
Decrease in net	348,617

The statement of the Cincinnati, Indianapolis, St. Louis & Chicago for April is as follows:

	1888.	1887.	Inc. or Dec.
Gross earnings	$206,256	$202,743	I. $3,513
Oper. expenses	132,578	126,258	I. 6,320
Net earnings	$73,678	$76,485	D. 2,807
Taxes	5,000	4,915	I. 85
Fixed charges	33,333	47,925	D. 14,592
Surplus	$35,345	$23,645	I. $11,700
Total surplus	450,045	363,912	I. 86,128

The following is the statement of the Lake Shore & Michigan Southern for the half year ending June 30 (June being partly estimated), as compared with same period of the previous year:

	1888.	1887.	Inc or Dec.
Gross earnings	$8,671,895	$8,644,336	I. $27,559
Op. expenses and taxes	5,328,960	5,068,138	I. 260,822
Per cent. of expenses	61.45	58.63	
Net earnings	$3,342,935	$3,576,198	D. $233,263
Fixed charges	1,800,000	1,830,000	
Balance	$1,542,935	$1,746,198	
Equals per share	3.12	3.53	

Operating expenses include all expenditures.

The following is the statement of the earnings of the Michigan Central for the six months ending June 30, compared with that of the last year, June, 1888, being partly estimated:

	1888.	1887.
Gross earnings	$6,535,000	$6 361,000
Oper. expenses and taxes	4,725,000	4 511,000
Per cent. of expenses	72.3	70.9
Net earnings	$1,810,000	$1,850,000
Interest and rentals	1,260 000	1,276,000
Surplus	$550,000	$574,000
Proportion to Can. So. Co	159,000	170,000
Balance	$391,000	$404,000
Div. 2 per cent	334,764	374,764
Balance	$56,236	$29,236

Receiver McNulta has issued the report of receipts and disbursements for the month of May, which is summarized below:

Balance cash on hand April 30, 1888	$150,224	
Receipts during the month	716,458	
		$866,682
Disbursements during the month		658,627
Balance cash on hand May 31, 1888		$208,055

The following is a summary of receipts and disbursements from Jan. 1 to May 31:

Receipts:		
From operation of road		$12.880,021
Disbursements:		
For operation of road	$10.116,009	
For track rentals	238,036	
For New York & Pacific Car Trust Association, interest and expenses	183,920	
For interest on 1st mortgage bonds and for Chicago & Western Indiana sinking fund	1,622,685	
For personal in jury claims, prior to Jan. 1, 1887	7,131	
For taxes	437,662	
For allowances to bondholders and counsel	60,886	
For amount paid for Chicago & Western Indiana property	636	
For payments account steamer line	5,000	
		$12,671,965
Balance, cash on hand May 31		$208,056

Early reports of monthly earnings are usually estimated in part, and are subject to correction by later statements.

Month of May:					
Balt. & Ohio:					
Lines E. of O	$1,307,624	$1,305,176	I.	$2,448	0.1
Net	409,565	421,534	D.	11,969	2.6
Lines W. of O	407,864	358,372	I.	49,492	13.7
Net	62,001	38,901	I.	23.100	30.5
Total all lines	1,715,488	1,663.548	I.	51,940	3.1
Net	471,566	460,435	I.	11.131	2.4
Cape F. & Y. Vy.	22,190	18.730	I.	3,460	17 0
Net	7,372	7,767	D.	395	5.1
Cleve. & Canton	34,496	31,290	I.	3,206	9.7
Net	11,251	8,469	I.	2,782	2.5
Det., B. C. & Al	48,476	46,067	I.	2,409	4.4
Net	21,569	20,630	I.	939	4.5
Staten Is. R. T	76,386	75,274	I.	1,112	1.3
Net	22,893	21,619	I.	1,274	4.8
Summit branch	122,171	103,895	I.	18,276	17.4
Net	13,328	10,807	I.	2,521	20.0
Lykens Valley	93,873	46,123	I.	47,750	102.2
Net	825	Def. 26,957	I.	27.782	106.3
W. Va. Cent. & P.	56,392	20.354	I.	36.038	180.0
Net	19,792	6,176	I.	13,616	217.0
Month of April:					
C., I., St. L. & C.	206,256	202,743	I.	3,513	1.4
Net	73,678	76,485	D.	2,807	2.6
Den. & R. G	576,161	565,744	I.	10,417	1.8
Net	142,194	157,301	D.	15,108	9.5
Lake E. & W	151,220	145,380	I.	5.840	3.4
Net	43,897	46,824	D.	2.929	4.4
L., N. A. & Chic.	173,955	159,854	I.	14,101	8 8
Net	59,173	16,434	I.	42,739	262 5
Mex Central	487,899	364,108	I.	123,791	33.8
Net	194,866	151,072	I.	43,794	28.5
Five months—Jan. 1 to May 31:					
Cape F. & Y. Vy.	127,224	105,347	I.	21,877	20.0
Net	50,015	49,817	I.	9,198	18.4
Cleve. & Canton	150,197	142,362	I.	7,835	4.9
Net	44,428	30,537	I.	13,891	43.3
Det., B. C. & Al	186,871	169,302	I.	17.569	10.1
Net	75,317	82,478	D.	7,161	8.5
St. I Rap. Tran	257,718	253,289	I.	4,429	1 6
Net	28,226	18,898	I.	9,328	50.0
Summit branch	601,469	467 643	I.	133,826	28.4
Net	94,545	Def. 1,113	I.	95,658	
Lykens Valley	442,337	237,727	I.	204,610	86.1
Net	Def. 19,709	Def. 91,820	I.	72,111	79 1
W. Va. Cent. & P.	228,074	129,447	I.	98,627	86.0
Net	86,081	40,988	I.	45,093	112.5
Four months—Jan. 1 to April 30:					
Den. & R. G	2,219.145	2,267,054	D.	47,909	2.7
Net	543,592	842 292	D.	298,700	35.4
Lake E. & West	598,444	626,323	D.	27,879	4.3
Net	193,459	215,274	D.	21,815	9.7
L., N. A. & Chic	636,598	652 683	D.	16,085	2.4
Net	158,405	119,201	I.	39,204	32.8
Mexican Central	2,032,391	1,572,665	I.	459,726	29.2
Net	916,489	738,632	I.	177,857	24.0

Earnings of railroad lines for various periods are reported as follows:

Five months—Jan. 1 to May 31:

	1888.	1887.	Inc. or Dec.	P.c.
Atlantic & Pac.	$1,107,022	$1,176,157	D. $69,135	5.9
Buff., R. & Pitts.	747,807	787,045	D. 39,238	4.9
Bur., C. R. & Nor.	1,026,533	1,155,025	D. 128,492	11.1
Cairo, V. & Chic	274,592	285,154	D. 10,562	3.5
Cal. South	780,998	634 797	I. 146,201	23.1
Canadian Pac	4,598,709	3,669,286	I. 925,023	25.2
Cape F. & Y. V	126,952	105,483	I. 21,469	20.0
Central of Iowa	537,594	523,922	I. 13.672	2.5
Ches., O. & S. W.	767,161	681,351	I. 85,810	12.4
Chic. & Atlantic	873,266	838,339	I. 34,927	4.1
Chi. & East. Ill.	799.971	775,909	I. 24,062	3.1
Chi. & Ind. Coal.	207,230	148,088	I. 59,142	40.0
Chi., Mil. & St. P.	8,551,500	9 074,272	D. 522,772	5.7
Chic. & N. W	9,189,999	9,633,619	D. 443,620	4.6
Chic. & Ohio R	18,415	27,000	D. 8,585	29.7
Chi., St. P. & K. C.	761,749	447,811	I. 313.938	70.1
Chi. & W. M	548,632	547,010	I. 1,622	0.2
Cin., J. & Mack	185,519	161,875	I. 23,644	14.1
Cin., N. O. & T. P.	1,421,035	1,298,577	I. 122,458	9.6
Ala. Gt. South	624,433	597,252	I. 27,181	4.5
N. Orl. & N. E.	345,163	271,134	I. 74,029	27.3
Vicks. & Mer	191,894	209,525	D. 17,631	8.1
V., Shre. & P	201,934	206,266	D. 4,332	1.9
Cin., R. & Ft. W.	164.803	159,480	I. 5.313	3.2
Cin. & Spring'd.	452,694	441.420	I. 11,274	2.5
Cin., W. & Balt	828,626	836,699	D. 8,073	0.9
Cleve., Ak. & Col.	240,445	215,406	I. 25,039	11.5
Cl., C., C. & I	1,602,667	1,634,576	D. 31,909	1.9
Cleve. & Mar	108.588	125,637	D. 17,049	13.6
Col. & Cin. Mid	123,784	120,441	I. 3,343	2.5
Col., H. V. & T	1,063,077	1,092,944	D. 29,867	2.7
Den. & R. G	2,841,145	2,878,295	D. 37,150	1.3
Den. & R. G. W.	480,080	377,797	I. 102,283	27.1
Det., B. C. & Al.	187,096	169,302	I. 17.794	10.1
Det., Lan. & No.	374,385	444,194	D. 69,809	15.5
Du., S. S. & At	416,062	362,339	I. 53,723	14.6
E. Tenn., V. & G.	2,211,978	1,969,484	I. 242,494	12.3
Ev. & Indianap	88,953	89,965	D. 1,012	1.1
Ev. & Terre H	328,943	323,170	I. 5,773	1.5
Flint & P. M	1,034,070	1,039,481	D. 5,411	0 5
Fla. Ry. & N. Co.	459,629	450,252	I. 9.377	2.0
Ft. W. & Den. C	334,119	246,009	I. 88.110	36.0
Georgia Pacific	506,348	437,861	I. 68,487	15.5
Gr. Rapids & Ind.	875.903	876,324	D. 331	0.1
Other lines	79,644	56,094	I. 23,550	41.1
†Grand Tr. of Can.	6,800,987	7,436,284	D. 635,297	8.5
Gulf, Col. & S. F.	975,019	895,240	I. 79.779	8.8
Houston & T. C.	853,784	875,942	D. 22,158	2.5
Ill C. (I. & S. Div.)	4,566,783	4,427,092	I. 139,691	3.1
Cedar F. & M	32,863	49,604	D. 16,741	32.7
Dub. & Sioux C.	322,548	312,003	I. 10,545	3.2
I. F. & S. City	309,262	250,881	I. 58,381	23.2
Kanawha & Ohio.	104,280	51,580	I. 52,700	102.0
*K. C., Ft. S. & M.	1,553,097	1,782,884	D. 229,787	12.8
*K. C., Cl. & Spr.	91,977	95,356	D. 3,379	3.1
Keok. & West	125,426	124,020	I. 1,406	0.8
Kingston & Pem.	68,659	53,573	I. 15,086	28.3
Lake E. & W	748,905	762,308	D. 13,403	1.7
Lehigh & H.	91,276	98,535	D. 7,259	7.1
L. Rk. & M	294,822	315,039	D. 20,217	6.3
Long Island	1,047,831	995,356	I. 52,475	5.2
Lou., Ev. & St. L.	375,493	386,192	D. 10,699	2.6
Louisv. & Nashv.	6,342,754	6,156,936	I. 185,818	3.0
Louis., N. A. & C.	821,730	830,253	D. 8,523	0.9
Lou., N. O. & Tex	971,738	805,004	I. 166,734	20.6
Mar., Col. & Nor.	34,211	21,400	I. 12,811	57.1
Memphis & Chas.	668,678	645,178	I. 23,500	3.5
‡Mexican Central	2,467,302	1,967,408	I. 499,894	25.4
‡Mexican Rail.	1,603,605	1,496,207	I. 106,794	7.1
Mil., L. S. & W.	878,491	1,093,256	D. 214,765	19.6
Mil. & Northern.	397,622	369,775	I. 27,847	7.3
Minn. & St. L.	504,987	631,706	D. 126,719	20.0
Mobile & Ohio	997,924	974,053	I. 23,871	2.3
Nash., C. & St. L.	1,261.834	1,213,209	I. 48,625	3.9
Nat., Jack. & Col.	62,623	64,767	D. 2,144	3.1
N. Y. C. & H. R.	13,726,417	13,878.111	D. 151,694	1.1
N. Y., O. & West.	605,156	532,384	I. 72,772	13.5
Norfolk & West.	1,928,290	1,518,387	I. 409,903	26.8
Northern Pacific.	5,818,823	4,298,051	I. 1,520,772	35.3
Ohio & Miss.	1,444,494	1,593,400	D. 148,906	9 3
Ohio River	149,887	102,174	I. 47,693	46.1
Ohio Southern	235,279	232,790	I. 2,489	0.8
Oreg. R. & N. Co.	2,257,631	1,826 178	I. 421,453	22.9
Pitts. & Western.	720,648	769,641	D. 48,993	6.2
Rich. & Danville	1,935,212	1,684,138	I. 251,074	14.8
Va. Mid. Div.	684,764	609,881	I. 74,883	12.1
Char., C. & A.	375,130	327,987	I. 47,143	14.4
Col. & Gr. Div.	259,313	219,556	I. 39,757	17.8
West. N. C. Div.	260,103	269,110	D. 9,007	3.3
W. O. & W. Div.	42.643	38,715	I. 3,928	8.0
Ashev. & S. Div.	40,987	17,701	I. 23,286	135.3
Tot. Rich & Dan	3,598,152	3,167,088	I. 431,064	13.6
§St. L., A. & T. H.	778,526	798,938	D. 20,412	2.5
Branches	362,076	361,404	I. 672	0.2
St. L., A. & Tex.	1,019,040	827,233	I. 191,807	23.1
St. L. & San F	2,060,592	2,249,132	D. 188,540	8.4
St. P. & Duluth	471,567	508,405	D. 36,838	7.1
St. P., M. & Man.	3,327,979	2,833,038	I. 494,941	17.5
San A. & Aran. P.	356,904	146,080	I. 210,824	143.9
Shenandoah Val.	312,562	320,638	D. 8,076	2.5
Stat. Isl. Rap. T.	258,323	253,289	I. 5,034	2.0
Texas & Pacific	2,421,185	2,220,204	I. 200.981	9.1
Tol., A. A. & N. M.	243,089	198,010	I. 45,079	22.7
Tol. & Ohio Cent.	469,765	391,927	I. 77,838	19.8
Tol., P. & West	347,179	362,118	D. 14,939	4.0
Wabash West	2,101,743	2,379,972	D. 278,229	11.7
West. N. Y. & P.	1,117,220	1,007,372	I. 109,857	10.8
Wheeling & L. E.	360,148	291,532	I. 68.616	23.4
Wisconsin Cent.	1,362,591	1,310,974	I. 51,617	3.9
Total	$31,917,999	$27,171,588	I. $4.746,411	3.8

* Includes three weeks only of May in each year.
† To June 2.
‡ Mexican currency.
§ Including Indianapolis & St. Louis.

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